TEKTRONIX PRIMER ON PROBES ETC

When the probe is first connected to the oscilloscope, compensate it by applying a low frequency square wave (1 to 10 kHz normally) to achieve the equalization of time constants. Improper compensation will result in either overshoot, roll-off or incorrect signal amplitudes (see Compensation Effects figure Probe Accessories).

The charts on Oscilloscopes to Probes, Cross Reference give you information on specifications, oscilloscope compatibility and obsolete probe replacements to help you select the right probe for your application.

Consider the Following Factors in Making Your Probe Selection:

Match Probe to Scope Input Resistance and Input Capacitance - Be sure the desired probe will match the input resistance and capacitance of the oscilloscope being used.

Fifty Ohm scope inputs will require 50 Ohm probes. One megohm scope inputs will require 1 megohm probes. Also check for connector interface compatibility or choose the appropriate adapter required. 1 megohm inputs may also be used with appropriate 50 Ohm adapters.

Match to Scope Bandwidth and Rise Times - Select a probe with adequate rise time and bandwidth for the oscilloscope and application.

Probe Loading Effects - Minimize probe loading effects by selecting low-impedance test points. Although the input impedance of a probe is made as high as possible, it still will always have some finite effect on the circuit under test. Usually cathodes, emitters and sources are preferred over plates, collectors or drains. Inputs to high-impedance dividers should be used rather than the midpoints.

Be aware of the fact that the input impedance of a probe varies inversely with frequency. Example: A probe having a bandwidth of 50 MHz and an input resistance of 10 megaohm at DC would have an input resistance of approximately 1.5 Kilohm at 50 MHz. Choose the probe with the lowest possible input capacitance and highest input resistance for best overall signal fidelity.

Date: Thu, 15 Jul 1999 16:11:33 -0500
From: Terry Muncey <tsm@electrosys.com>
Subject: RE: Tek scope 502A

-----Original Message-----
Do you have the maintenance manual and schematics for this scope?
Thanks in advance. W.Li

Yes, catalog # R29127 cost is $51.80 (real big manual) + S&H, you can order direct on the web at http://www.radioera.com/order.htm if you want.

Date: Mon, 19 Jul 1999 15:47:50 +1000
From: Morris Odell <morriso@vifp.monash.edu.au>
Subject: Re: [R-390] Tek scope 502A

> nearly working Tek scope 502A for $40. Can anyone briefly send me some
> specs?... before I lash out for the $51 manual.

I love test equipment too and in fact a 502 was my first Tek scope - I still have it in the basement storeroom. The 502(A) was a high sensitivity true double beam scope which was sold to biological research and electrophysiology labs. It uses a special double gun double beam CRT and thus has two completely independent vertical channels without alternate or chopped trace facility. The timebase is common to both beams. The very sensitive narrow band DC coupled vertical amps achieve 1 MHz bandwidth at the low sensitivity end, falling to about 100 KHz at 200 microvolts per cm. The amps are shock mounted and contain Telefunken 12AX7s that are prized by the audiophoole community. Their heaters are run from DC. The rest of it (HV supply, timebase, calibrator) are typical Tek circuits of the 530/540 type. The 502 power supply is a bit different from the 530/540 series in that it uses vacuum tube rectifiers (? less noisy) so there's no time delay relay . It's quite a nice scope for DC and audio measurements but useless for RF. The amplifier response falls off very quickly above the spec limit. I remember my 502 as being rather difficult to keep in spec with regard to intensity balance. The HV circuitry is set up in such as way that the relative intensity of the two beams is balanced with a preset pot. It used to drift quite a bit as it warmed up. Not a fatal fault but it could be irritating. I liked it a lot and used it on the bench for a good few years until a 535A came my way. 73 de Morris VK3DOC

Date: Mon, 19 Jul 1999 04:47:00 -0700
From: Dan 'Hank' Arney <kn6di@groupone.net>
Subject: Re: [R-390] Tek scope 502A

Call Deane Kidd in Sherwood.OR. he is listed in the book. He has manuals and parts. Very good reliable service, and the prices are also good. Hank

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Date: Mon, 19 Jul 1999 08:18:18 -0700
From: dma@islandnet.com
Subject: Re: [R-390] Tek scope 502A

If Nolan can't find his manual, let me know, and if you still need the specs I can copy a few pages of the manual for you. Jan

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Date: Mon, 19 Jul 1999 03:15:38 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Tek scope 502A

Traffic has been low. Well, up until I triggered a near riot that is...It's a true dual beam with a bandwidth of about 1 Mhz if I remember right. ....

Email me back with the exact model number and if it's a rack mount model or not and the serial number of the scope. I owned a few of 502's and 502A's and probably still have an original manual in the correct SN range that I'll make you a good deal on. Photocopies of the old Tek scope manuals usually suck on account of a lot of the test measurement values being printed in them in light blue which doesn't copy worth a damn.

Date: Mon, 19 Jul 1999 10:25:41 -0400
From: Christian Fandt <cfandt@netsync.net>
Subject: Re: [R-390] Tek scope 502A

Yes, about 1 MHz for sure. Nolan means that there are actually two electron guns in the CRT thus making it a 'true' dual beam as opposed to the typical dual beamers which simply alternate which of the two input channels are sent to the single-gun CRT. Great for catching short duration events which could be distorted or even hidden by the switching action.

>>before I lash out for the $51 manual from RadioEraArchives....

$51? Ouch! Seems kinda high but who cares what they sell it for: everybody's permitted to shop around ;) That's right. Some copiers will copy the blue though. I recall those were the ones which used a white light source as opposed to the ones with greenish exposure lamps. Look for those if you need to copy such things.

Date: Mon, 19 Jul 1999 11:07:14 -0600 (MDT)
From: Richard Loken <richardlo@devax.admin.athabascau.ca>
Subject: Re: [R-390] Tek scope 502A

Those are called dual trace scopes not dual beam scopes. Philips used to make some dual beam scopes back when I was in technical school circa 1970. Nice scopes which put everybody to shame except Tek and HP (in that order).

Date: Mon, 19 Jul 1999 14:14:13 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Tek scope 502A

It's been a few years since I've owned any of them, but I seem to remember that Tektronix actually used the wording Dual Beam on the front panel and in the manuals to differentiate between them and the less expensive Dual Trace scopes. The CRT used separate guns, and deflection plates for each of the two channels for a really nice non-flicker display. You could set one beam to sweep at say a second and the other at a ms and each trace would display 100% of the time, there was no "switching" back and forth. It's too bad that the bandwidth of the 500 and 502A were only a Mhz or so. Come to think of it, I think that the 502A had more bandwidth than the 502. Maybe it was a 2 Mhz scope, or it was the 1Mhz one and the 502 was a 500Khz scope. I need to dig around and find the manuals to be sure.

The 502 and 502A were common as dirt around the New Orleans area about 15 years ago. NASA Michoud and Stennis Space Center cut a bunch of them loose on the surplus market along with a mess of the higher numbered models and thousands of plug-ins. almost everything that was sold off was "current" as far as calibration certification. You don't see that much anymore.

>Philips used to make some dual beam scopes back when I was in technical school circa 1970. Nice scopes which put everybody to shame except Tek and HP (in that order).

Those old Tektronix 500 series scopes were true works of art. Wonderful examples of quality craftsmanship.

Date: Mon, 19 Jul 1999 14:51:46 -0700
From: dma@islandnet.com
Subject: Re: [R-390] Tek scope 502A

>It's been a few years since I've owned any of them, but I seem to
>remember that Tektronix actually used the wording Dual Beam on the
>front panel and in the manuals to differentiate between them and the
>less expensive Dual Trace scopes.

Sure did - I'm looking at the manual and scope as I hunt and peck.

>The CRT used separate guns, and deflection plates for each of the
>two channels for a really nice non-flicker display. You could set one
>beem to sweep at say a second and the other at a ms and each trace
>would display 100% of the time, there was no "switching" back and forth.

I had to go look at the scope to see if it had two independent time bases. It doesn't. It has two independent sets of vertical plates, but only one hosizontal set. But I expect what Nolan is remembering is that you can use the sweep magnification function to simultaneously look at part of the waveform shown on the upper trace magnified on the bottom trace.

>It's too bad that the bandwidth of the 500 and 502A were only
>a Mhz or so. Come to think of it, I think that the 502A had more
>bandwidth than the 502. Maybe it was a 2 Mhz scope, or it was the 1Mhz
>one and the 502 was a 500Khz scope. I need to dig around and find the
manuals to be sure.

I have the 502 and the 502 manual. It's specs are 200 microvolts per centimeter deflection at 100 kc (that's what the manual says - not kHz) and 0.2 volts/cm at 1 mc. These scopes are still of interest to audiophiles - not for the tubes (but probably for that as well) but because they are very high sensitivity and have very good differential input rejection ratios. I seem to recall Stan Griffith telling me that it was this that made these scopes so unique, but to maintain the ratios required great care in selecting replacment tubes for the vertical amplifier.

Of interest is that there are transistors in this scope. I kid you not. A 2N301 and 2-2N214s. Germanium I think. Even then sand was trickling into our hardware!

>Those old Tektronix 500 series scopes were true works of art. Wonderful
>examples of quality craftsmanship.

My manual has a nice little pocket in the back with a sheet entitled "Calibration Record." Filled out by hand and signed by a Frank Glass 'Calibration Engineer' and Ralph Sawyer 'Quality Control Engineer' in April, 1959. I've not seen one of these for later scopes, so maybe this was an early innovation!

There was also a mod kit for the 502 that provided the usual variable time/cm control. My scope has it installed.

I have no idea on earth what I shall ever do with this thing. But a lab was being shut down - it was in like-new condition - and kinda followed me home.
Jan Skirrow

Date: Mon, 19 Jul 1999 17:39:52 -0500
From: Tom Norris <badger@telalink.net>
Subject: [R-390] Re: Tek scope 502A

Indeed. I recently moved up to a job at Arnold AFB here in TN. During the performance of my duties (electronic instrumentation tech) I have run across dozens of assorted Tek tube-type scopes. The 502 is a popular scope in some of the older test cells because, as one engineer put it "They work well, they keep their cal better than some of the newer gear, and they do what we want them to do. " Most are in older control and test areas, but are still in daily use. AEDC is a fun place to work, especially for a gadget junkie like me. Check out their web page at www.arnold.af.mil for more info on what they do there.

Date: Tue, 20 Jul 1999 09:52:55 +1000
From: Morris Odell <morriso@vifp.monash.edu.au>
Subject: Re: [R-390] Tek scope 502A

> Of interest is that there are transistors in this scope. I kid you not. A
> 2N301 and 2-2N214s. Germanium I think. Even then sand was trickling into our hardware!

They are there to regulate the DC heater supply to the input tubes. Come to think of it, it would be hard to imagine a 6.3 or 12.6 volt DC heater supply regulated by tubes. In their bigger scopes Tek used a tube regulated 100 volt DC supply to feed lots of heaters in series. All the serious work in the 502 is done by tubes :-)

> I have no idea on earth what I shall ever do with this thing. But a lab was
> being shut down - it was in like-new condition - and kinda followed me home.

It's enough that you saved it. At a recent antique radio auction here a 502 hardly raised a bid and may ultimately be trashed :-(A couple of us who knew its significance were quite upset - if I didn't already have one I would have bought it.

Date: Mon, 02 Aug 1999 09:25:59 -0700
From: Lawrence Mayhew <lmayhew@ibm.net>
To: W Li <wli@u.washington.edu>

I forgot to tell you about the 502 having two independent (vertical axis only) electron beams. For some low frequency work it was impossible to use a "chopped" vertical to view two signals that had been multiplexed. There was another Tek scope with two beams, the other was the 519. It was built for the AEC to view phenomena associated with the nuclear tests in Nevada. It's bandwidth was over 1 Gigahertz without sampling or other "cheats".

Date: Fri, 18 Feb 2000 07:28:24 -0400
From: "Guido E. Santacana" <laffitte@prtc.net>
Subject: [R-390] Oscilloscope Question TK -502A

I know that this is not R390 stuff but where else can I go. I just became the owner of a nice Tektronix 502 double beam oscilloscope but no manual. One beam is working just right but the lower beam is missing. Is there anyone in the list familiar with this scope? In any case it will eventually be in the service of my R390s.

Date: Sat, 19 Feb 2000 09:55:27 -0500
From: Christian Fandt <cfandt@netsync.net>
Subject: Re: [R-390] Oscilloscope Question

I don't have a manual handy but we used 502's, -A's and B's at work for years back in the 70's and 80's. The circuits for each gun are virtually identical. With an identical signal on each input, you can start by tracing back from the grid/cathode/anode pins up to the front end and see where the sig is dropped.

You should note that the bandwidth is 500KHz. Absolutely great for audio and VLF but pushing the limit when even checking the 455 KHz IF sigs on the 390. I might pick one up someday if it works, nearby to haul away in the car and the right price.

Date: Mon, 22 May 2000 20:31:28 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Instruments

At 07:53 PM 5/22/00 -0400, you wrote: the second is a Tektronix 543A. Tektronix! <grin>

>Type 53/54C dual trace
>AN-1839A dual
>Type CA dual trace
>Type M four trace
>Type 1A1 dual trace
>Type 1A2 dual trace
>Type 1A5 dual trace

The 1A2 is the best of the bunch. Put your effort into it. Manuals are available but tough to find at a good price. DO NOT buy a photocopy of it. Get an original. Tektronix used light blue troubleshooting info in those old 5xx series manuals and it usually doesn't show up well if it's a photocopy.

Also, make sure that the SN range of the manual is equal to or exceeds the SN of your 1A2. There were a hell of a lot of production changes on it. I have three or four of the 1A2's and all of them are different. ;-(

>The question I have about the plug in's are these all usablewith the 543A.

I've never seen a AN-1839A but all of the rest will work in the 530 and 540 series scopes.

>others came with the 543A. Except for the Type M I have no manuals for any of this stuff.

I've been looking for an M manual for a while. The M is OK but the usefulness of 4 traces on a 5" round CRT is questionable. I was playing around a while back with one of my Tek's with a total of 8 traces I think it was. Fun, but not practical. <grin>

>which one of these plug in modules would be the most useful for working on the R388, R390, SP600, etc, etc....

Put your effort into the 1A2 followed by the 1A1. Both were exceptional plug-ins. nolan

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Date: Mon, 22 May 2000 23:15:13 EDT
From: Kenneth A Crips <w7itc@juno.com>
Subject: Re: [R-390] Instruments

RE: The 1A2 is the best of the bunch. This is interesting the 1A2 module has label on it that says AREA 51. I don't suppose Techtronix still has manuals for this unit. Thanks for reminding me about the spelling I have corrected My spell check. Just so you out there don't think there are anymore deals out there I paid 20 dollars for all this Techtronix gear and two roll around stands, of course that might be all it's worth. The bottom line is I have it with enough spares to keep it going for along time.

Date: Fri, 26 May 2000 02:05:25 -0400
From: eengineer <eengineer@erols.com>
Subject: Re: [R-390] probes

Not all TEK probes are interchangeable. I have found this out the hard way. We have some good scopes at work (Tek 2445 TEK 2440 etc) and some bad ones (the $995 tek 220). The BNC ends on some of the NEW 220 scopes don't mate properly on the old scopes, and funny things happen. Some of the old TEK scope probes have a ring around the BNC to select 1x/10X probes and the new BNCs dont mate properly to this. Just a warning. Cheers, Jeff

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Date: Fri, 26 May 2000 09:53:16 -0400
From: Michael Tallent <mtallent@concentric.net>
Subject: Re: [R-390] probes

Once again now - Everybody- There is no C in the word TeKtroniX :-). The P6006 probe should have a ground lead which clips on usually where the strain relief on the cable joins the gray plastic of the probe body. Most of the new probes should work, they will usually be BNC connectors. You should watch for the max DC voltage rating as you will be using them for higher voltages with boatanchors stuff. A probe with a X1-X10 switch would be useful as the older

scopes have limited sensitivity, and where the capacitance loading is not important, you can use the X1 setting and get higher sensitivity.

Date: Fri, 26 May 2000 10:19:04 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] probes

The selenium rectifiers will need replacing, if they haven't been already. The P6006 probe is decent, though tender. The tip ground is from a ground wire that clips around the probe at the front of the strain relief. They come in various lengths. Last I looked, Tek sold such accessory kits for a reasonable price. The kit includes pinchers and various lengths of ground wires. When shopping for probes with attenuation (and in a BA, there's rarely a need for a direct probe which can be a piece of RG-59 though it will have more capacitance than a Tek probe) its important that the scope input R and C are in the range that the probe can match. Tek probes are the best, though could cost more new than the used price of the 543. Tek rates scope and probe bandwidths as the frequency flat, while some other (and more economical) makers rate scope and probe as 3 dB bandwidths. Makes a significant difference. I say Tek probes are tender because they are abusable. The coax is made with foam dielectric and a hair wire center conductor to minimize capacitance. The cable is not available anywhere that I've found. The center conductor is nichrome or stainless steel and is nearly impossible to solder so is crimped, but I have fixed a probe or two. Its not so pretty, but works. One new probe with my Tek 475 was intermittent for 15 years or so until I cut off a strain relief and fixed up a faulty braid connection.

I'm not much of a fan of switchable probes that switch at the matching box on the scope end of the cable. They have the cable C in circuit in the attenuated position and it significantly detunes RF and IF tuned circuits.

Given a choice of surplus P6006 and something aftermarket, I'll take the Tek probe.

Date: Fri, 26 May 2000 14:27:14 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] probes

Some Tek numeric series history as I remember it. I could dig into my collection of Tek and Tucker catalogs and refine it to dates, but it begins in the 1950s.

In the beginning Tek made the 50x one piece scopes, no plug ins.

Then they made the 51X with a few MHz bandwidth.

Then the 53x and 54x as large with vertical plug ins, began with letter series then went to 1Xn later. Some in the series could take two vertical and a

horizontal plug in. The 53x and 54x series were copied by other military contractors which eventually cost uncle Sam a few million in penalties for theft. I found that plain 7400 series TTL logic could function on things that wouldn't trigger my 543 though it was good enough for my Phd research (on using the power line at about 60 Hz for communications). I sold it to the dean of the ISU engineering college. The 53x main frames had a bandwidth of 20 MHz and the 54x mainframes went almost to 30 MHz, though few plug ins were as fast as the mainframe.

And then the 585 wider band scope with incompatible plug ins. And a sampling plug in useful for cable checking.

These were all well used by 1963 when I graduated the first time.

By 1969 the 56x family of compact scopes with two compact plug ins were around, the 564 offered screen memory...

Sometime after that the 5000 and 7000 series of scopes with many miniature plug ins arrived, and they had few tubes other than the CRT and high voltage rectifiers.

The first truly portable scopes were in the 45x family, though the later 465, 475 and 485 put them to shame. The 465 and HP 1740 came out at the same time with only a couple words different in their specifications. They both work very well and either is a good choice for a relatively modern portable dual trace scope for all work up to 100 MHZ. I spent the money ($2100) on a new 475 figuring the 200 MHz speed would fill my needs for a long time and it has. I'm no fan of digital scopes.

Then the 24xx analog series came along and I've lost track since. The prices in the catalogs cause my eyes to glaze over and I figure I'd rather have a truck than a scope for the same price... Or a house for the price of a spectrum analyzer. I guess I continue to dream...

As for range switching rings, I know the 465-485 had them, probably the 5000 and 7000 families too. But not the 45x, 56x, 53x, or 54x.

Date: Fri, 26 May 2000 21:24:18 -0700
From: "Larry Shorthill" <rfssi-shorthill@mindspring.com>
Subject: Re: [R-390] probes

Check out the Tek website. They should have probes listed in their accessories list. I am willing to bet that the current listing of probes costs more than what you paid for your old scope. But, they will work for you on your old scope just fine. Tek had a whole division making probes and accessories for their instruments.

There is a lot more in them than you would first believe. For one thing, a probe and it's connected instrument should not "disturb" the circuit under test. This would mean, zero capacitance, infinite impedance and infinite bandwidth. These are mutually impossible to meet for most situations. If you work in a 50 ohm environment, then their are methods for working in that environment, but since these are boatanchors, they have impedances all over the map. That means that the probes should be as I just described.

Now, in passing, no one made better probes than Tek, and I suspect that is still the case. For one thing, they make low C probes with special low loss coax and they provide superb "compensated attenuators" where the RC time constants of the two elements of the attenuator are totally matched (or can be by proper calibration). I would not recommend any other brand than Tek's own probes. You can't really go wrong with them, but there are some that afficianados will say are less good than others.

Date: Fri, 26 May 2000 21:49:52 -0700
From: "Larry Shorthill" <rfssi-shorthill@mindspring.com>
Subject: Re: [R-390] probes

The Tek 5000 series was a "lesser" cousin to the 7000 series of scopes. It was the economy version and doesn't have near the performance, although it came out about the same time. Also, the 900 series of scopes was built like an Electrolux vacuum cleaner in size and shape. It was the bastard child of the Tek lines. It was portable but not distinguished. If you want a real bench scope, aside from the 54x (especially the 547), the 7000 series, especially the 7704 and several others are prefered.

If you want a portable scope of that era, the 454A and the 475 and 485 are great. Inside Tek, the 465 was considered very fragile and not a favored variant (the rookie engineers always got the 465's because they were prone to breakage and because they sucked in general). Also the TM500 series of instruments were not very robust. I had a bench full of the TM500 mainframes and plugins and about 50% were broken at any given point in time. I recall the outputs of the function generators and pulse generators were always blown.

The scopes of that era were hot pluggable but if you did that with the TM500 modules you would likely blow the plugin.

Date: Sat, 27 May 2000 11:20:45 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] probes

I didn't consider the 5000 and 7000 series scopes when I last shopped because I needed portability. Can't bring a power plant home to the shop, nor a room sized printing plant motor controller or type setting system.

I liked the 465 that I've used, found them to have enough screen intensity to see 100 ns pulses triggered by hand with full room lights. I was a little disappointed that the 475 doesn't quite have that sensitivity.

In the time period I've owned the 475 its not been absolutely perfect though some of the failures have been mine, one major one Tek's. I broke front end attenuators playing with arcing high voltage. Have spares because I ordered more than needed to fix it.

A rectifier in the power supply failed open, and the worst thing was that the plastic cam for the delayed sweep switch coupling failed. Though there was a Tek part number for it, Tek would only sell the entire horizontal sweep board for half the going price of a used 475. I carved a new cam out of aluminum with a little lathe work and a dremel cutter in the milling machine and it works perfectly, will outlast the plastic several time.

The 465 was sold in very large quantities. The 465B probably was an improvement.

The functional difference between the 465 and the HP 1740 (a good scope too, some thought easier to teach to new users) is that when you check the trigger wave form on the 465 that's all you get to see, while that can effectively be a third channel on the 1740.

Seems to me that 900 series were Sony's anyway.

Compared to any HP scope BEFORE the HP 1740, any Tek scope was two generations better. Compared to any maker's scope at any era Tek scopes are generations better. HP caught up with the 1740. I'm satisfied with my 475 and I've not looked back or forward at other scopes since.

Date: Sun, 28 May 2000 12:40:54 +1000
From: "Chris Gill" <micro@iig.com.au>
Subject: Re: [R-390] probes

I have to agree with you Jerry and others re the Tek scopes, I was the tech responsible for ICAR, in IBM in the late 70's apart from 549,564 storage types, there were 100+ 453's a few 454's, plus the "modern" 465 & 475 and a few 485's. Without exception they easily surpassed their spec's, early 50Mhz bandwidth 453's with nuvistor front ends tended to roll-off (3db down) above

65mhz, but later Fet front-ends typically achieved the 90-100mhz and could still read up to about 150Mhz. Good performance is achieved with the 465/475 series as Jerry points out, the only criticism we had of the 475 is that the trace was not as "crisp" as the 453/454/485 but still an excellent performer. IMHO the 453 shouldn't be overlooked if you want a cheap usable scope, I have one that has been in almost constant use for 30 years without any major repairs needed. While I collect and use a lot of T & M gear, Tek scopes are the only ones I use, my "love" of these fine instruments goes back to 1953 and my dad's 535.

Date: Mon, 29 May 2000 12:58:46 -0700
From: "Larry Shorthill" <rfssi-shorthill@mindspring.com>
Subject: Re: [R-390] probes

Well, it's been a while so let me see if I can think best how to answer this. First, the 465 and 465B are not exactly the same scope. The B means it was a later "improvement", probably to make it cheaper, more reliable, or because of some other item like a new feature to combat the competition. The 400 series scopes were all portables (more like luggabe) and some of the first ones were commissioned by IBM for their service men. It didn't take Tek long to realize the market potential for this type of service instrument. The 453, and 454 and their A and B variants were in this group. I think the 454A was one of the best portables Tek ever did. In the 465, 475, 485 series, the 475 was probably the best, the 465 not being as robust (it broke too easily--at least within the Tek engineering community), and it was limited to 100MHz BW, if I remember correctly. The 475 had higher bandwidth (200? not sure), and the 485 was really fast for the day (about 350MHz I recall), but it had a very much smaller display due to the physics of deflecting a beam at high speed.

The 7000 series were mainframe scopes that replaced the 500 series. These were nick named new gen for new generation. They were solid state, had a very innovative switching supply and were built in 3 or 4 hole versions. There was a 7403 and maybe a 7404 meaning 3 and 4 holes, respectively. In the 3 holers, you could put in two vertical plugins and one horizontal. In the 4 holers, it was two of each. The chassis, 74xx or 77xx (don't recall if they did a 75xx and 76xx, but I think they did the 78 and 79), was capable of different speeds.

For example, the CRT was and still is the determining factor in how fast a vertical trace can be deflected. This is due to capacitance of the plates, physical configuration of the CRT, acceleration voltage, etc. The 77xx series were faster than the 74xx series by quite a bit, if you used the faster vertical plug ins because it used a higher speed CRT.

It also had more bells and whistles built into the mainframe so it was quite a lot more expensive. Tek had a series of storage scopes that used a phenomeon called secondary emmission where they would paint a single shot trace on the phosphor screen, then through a low energy flooding of the screen, the screen

would continue to glow where the orginal trace had been. One of the 7000 series had this capability, but I'm not sure which one. It could have been the 78xx family, with the 79xx being a gigahertz mainframe.

The Atomic Energy Commission bought a lot of the storage scopes, planted them down in a hole with a big A bomb and captured signature events from the explosion. Then with a video camera, they transmitted this visual outside where it was captured on some form of scan converter. The scope and the video camera would become vapor in the explosion, but the event was captured by the scope and camera for analysis. The scope had to work perfectly just one time in its career. The AEC kept coming back for more so it must have done its job.

Tek knew how to make scopes better than anyone, but they couldn't quite get the spectrum analyzers the way HP did, and in that era, Tek was unaware of the need for digital instruments, like logic analyzers. HP really bowled them over with a new class of instruments as the digital era came into being.

Date: Mon, 29 May 2000 15:04:02 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] probes

I liked the 465 for looking at single trace events. It had screen intensity to see 100 ns/ cm events in full room light. The 475 with its different CRT doesn't do that as well. The 475 may be unique in portables with a 2mv / cm range. The 475A sacrificed that range for 250 MHz bandwidth.

465-100 MHz
475-200 MHz
475A-250 Mhz
485-350 MHz.

The HP 1740 was the equal in performance to the 465, and many potential buyers (list prices were the same just all but a couple words of their specifications) felt the 1740 was easier to use. That was the first HP scope that ever competed well with Tek.

Date: Thu, 01 Jun 2000 09:22:05 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] Need Advice on O-Scope

Tek 456 or HP 1740. Some figure the 1740 is easier to learn to use. They are identical in performance, 100 Mhz, dual trace, portable, delayed sweep. Good enough DC calibration to dispense with VTVM on the work bench.

73, Jerry, K0CQ

- ---

Date: Fri, 02 Jun 2000 13:02:43 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] RE: Need Advice on O-Scope

I've been a fan of the 54x series Tek scopes for a long time and still am. Recently, the 7xxx series has gotten affordable. I now have five of the beasts, a 7603, a 7613 storage scope, and three 7704A's, one of which has PS problems that I can't figure out and will probably end up being a parts hulk. I've also got a couple of dozen or more plug-ins and some assorted residue plug-ins and parts. Larry Ware told me before I got involved with the 7000 series that they were addictive as hell. He was right. They're even more addictive than the old 5xx series.

>Add to that, I believe its a 300 mhz frame but don't hold me to that number.

The 7704A is a 200 MHz mainframe. My primary one is a cherry one with Option 9 which is a 250 MHz mainframe. The standard 7704 is a 150 MHz mainframe. One of the reasons that I decided to standardize on the 7704A, other than the fact that a mess of them were cut loose surplus locally for next to nothing over at Keesler AFB, was the fact that they're a fraction of the cost of the "hot" 79xx scopes. 3 and 400 MHz scopes.

All I mess with is HF. My old 50 MHz Tek 547 has never not been enough scope for anything I've ever needed to do. I can't see paying a serious premium for a 7904 or faster mainframe.

Date: Fri, 2 Jun 2000 13:40:38 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: [R-390] DQT (Was Need Advice on O-Scope)

DQT (Dumb Question Time):

How do I determine the bandwidth and/or frequency response of my scope? I have a TEK 561A with no paperwork. It goes down to 1us/div for the sweep speed, but I don't think that is the determining factor. Does frequency response have to do with its ability to "lock" onto a signal of a given frequency? How does bandwidth figure into this? First scope and it shows.

Date: Fri, 02 Jun 2000 13:15:36 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] DQT (Was Need Advice on O-Scope)

There are two determining factors in a scope's bandwidth, the main frame (including the CRT) and the plug in. Some of the vertical plug ins for the 561 are under 1 MHz bandwidth. That means about 1 microsecond rise time. Some are 10 MHz bandwidth. I don't think it gets out to 30 MHz with any plug in, but I'm not sure about that. Bandwidth determines the bandwidth of the sweep triggering signal, though the 54xA and 56xA used a tunnel diode trigger with lots of bandwidth, but it was still limited by the vertical amplifiers.

Date: Fri, 2 Jun 2000 12:25:31 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] Need Advice on O-Scope

Don't make the mistake of picking up the common 5000 series plug-ins for them - they don't fit.

Date: Wed, 31 May 2000 18:59:15 -0700
From: "Wayne Rothermich" <rother@impulse.net>
Subject: Re: [R-390] DQT (Was Need Advice on O-Scope)

Barry, It depends on the plug-in, but most 560-series vertical plug-ins are 10 MHz bandwidth.

You can check this with a sine wave signal generator by increasing the frequency until the peak-to-peak envelope reduces to 70% (-3dB). Be sure to terminate with 50 ohms at the scope input, and be sure the generator itself is not rolling off.

Alternately, a pulse generator can check scope risetime. The scope bandwidth will be about 1/(2.8*t). Again, be sure to terminate in 50 ohms, and check that the pulse generator's own rise time is much faster than what you measure.

I have a 564 storage scope and find it to be a very good scope for low frequency work. Sampling plug-ins are available to extend its frequency response (for repetitive waveforms) to the GHz region.

Date: Fri, 02 Jun 2000 18:55:53 -0400
From: Glenn Little <glittle@awod.com>
Subject: Re: [R-390] Need Advice on O-Scope

I can attest to the fact that 5000 and 7000 series plug ins are not compatible. I have a 7000 series plugin that I bought (cheap) at a hamfest. Someone had

forced it into the wrong connector. I was told that the wrong connector was in a 5000 series scope. Now the plugin will work in neither.

Date: Fri, 02 Jun 2000 21:04:48 -0500
From: Tom Norris <badger@telalink.net>
Subject: [R-390] RE: DQT (Was Need Advice on O-Scope)

The specs used in out PME lab are fairly simple - just hook the scope to the scope calibrator and press a button... errr. Well on scopes with IEEE ports we can do that. On normal scopes we usually* use the point where it rolls off to 95% of the lowest freq reading (usually 50Khz) as the maximum bandwidth. Sync is tested separately, and if it will not sync at spec'ed bandwidth, the bandwidth is limited to the highest sync freq and noted as such for the user. If a 250Mhz scope will not sync above 175Mhz, then it is no longer a really a 250 Mhz scope. Just some more non-390 related scope trivia for the bored. :-)

Date: Sat, 02 Sep 2000 08:09:16 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] O-Scope

>what is the best scope for BA's.....

Tek 465 with Tek probes.

Date: Sat, 02 Sep 2000 10:02:55 -0500
From: Randy & Sherry Guttery <comcents@mississippi.net>
Subject: Re: [R-390] O-Scope

I'm sure you'll get the usual Tek 465 advice - as it's a nice, competent and fairly compact scope. However I'll also recommend another Tek to consider - the 7603 and it's siblings: Available quite affordably, this 100Mhz (200Mhz in some of the sibling series) mainframe can be equipped to suit your needs: two single trace vertical and one dual time base plug-ins are the "usual" --- and provide dual trace with all of the usual sweep capabilities. Two dual trace plug-ins - and now it's a four trace scope. Replace the plug-ins with say a 7L12 - and now it's a fine spectrum analyzer capable of audio to microwave work. Other plug-ins are available to do other "neat things". Then you can pull the horizontal plug-in - place one of the vertical plug-ins in it's place - and have a very accurately calibrated x-y scope. While not "light" (usually right near 50 pounds) it is a "one man tote". In addition to the more common "totable" version, a rack version is also to be found. If you want a cheaper version of the 7603 - the military had a stripped version (two 65Mhz vertical, standard horizontal, no on screen digital readout) called the USM-281C -- note the "C" - as it's the Tek version --- The 281 / 281A was Hewlett Packard, nice, but no where the "C" scope; the "D" is a

lot nicer than the HPs - but still no match for the "C" (the D was made be Dumont). Obviously - being a plug-in model - if a module fails - it can be replaced - often cheaper than fixing. 465's - while nice - do have some weaknesses - that are a real pain to repair (some variants are worse than others - so some research is appropriate). 465's can't be "reconfigured" to improve / or add new capabilities either...

Date: Fri, 27 Oct 2000 11:51:10 -0600
From: Chip Owens <owens@atd.ucar.edu>
Subject: [R-390] MX-1487 Adapter

The R390A maintenance manual, in section 6.2.8, specifies use of the Adapter, Test MX-1487/URM-25D or Impedance Matching Network CV-206/URM-25F. This is in conjunction with the adjustment of the Gain Adjust pot, R519.

Since I don't have a URM-25 signal generator could someone please tell me what this adapter consists of and what people actually use in place of it? Is it one of the little aluminum boxes that you use between the signal generator and the point in the circuit the signal gets injected?

Date: Fri, 27 Oct 2000 13:23:46 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] MX-1487 Adapter

I'm not sure if it's the same thing, but Nolan Lee recently posted a link to the TB SIG 319 document which is a technical bulletin that shows the dummy loads that should be used to connect a URM-25 to an R390A. They are different numbers than mentioned in the maintenance manual, but I think they are the same thing. If they aren't, I would be interested in knowing the difference. Are these "dummy loads" the same thing as what the maintenance manual calls an impedence matching network?

Along these lines, does anyone know the impedence of the cable mentioned in that bulletin. It is CG-409/U. I assume it would be 50 ohm from the signal generator to the dummy load, but they use the same thing from the dummy load to the receiver where the impedence is about 150 ohms (I think). I notice they are pretty specific about the lengths which is, I assume, why they chose a particular cable. Any comments?

Date: Fri, 27 Oct 2000 13:09:18 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] MX-1487 Adapter

Yes, MX1487/URM-25D and CV-206/URM-25F are little boxes that are used between the generator and the radio. In this case simply a 51 ohm feed through

termination. E.g. two connectors connected together with a 51 ohm resistor to ground. Quite easily simulated with a BNC T connector and a 51 ohm coaxial termination. I found this out by looking at my partial URM-25D manual which shows the adapters in the schematic and by opening up the accessories in the front of my URM-25F cover.

Date: Fri, 27 Oct 2000 13:22:30 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] MX-1487 Adapter

The GC's in my URM-25F cover look like RG-58. Two are 5" long, the other one is several feet long but not tagged so probably isn't the original and it doesn't reach from connector clip to connector clip. Next time I stumble over that way I'll look at the cables to see if they really are RG-58. In the mean time the clients think I should show them new products.

None of the dummy loads in Nolan's posting match the MS-1487 A schematic in my URM-25D manual or what I found in the CV-206/URM-25F that I opened up for inspection.

Date: Fri, 27 Oct 2000 15:43:09 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] MX-1487 Adapter

I wonder if the velocity factor of CG-409/U comes into play here. As I said, the technical bulletin shows very specific lengths for these cables.

Date: Fri, 27 Oct 2000 16:22:48 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] MX-1487 Adapter

A short very mismatched cable at VHF looks more like a lumped capacitor, especially when the load is high impedance. So the distributed C is important, the rest is not. 150 ohm coax is hard to make.

Date: Fri, 27 Oct 2000 22:27:23 -0400
From: twleiper@juno.com
Subject: Re: [R-390] MX-1487 Adapter

> I wonder if the velocity factor of CG-409/U comes into play here. As

> I said, the technical bulletin shows very specific lengths for these cables. > Barry - N4BUQ

Well, whatever the V-Factor, it certainly would be off after all these years, and I can't imagine putting a tuned element into the equation. I suspect it is just the military way... a spec for everything. In this case, the length that will properly stow. It also prevents the military service personnel from having to make a judgement call, such as "How long does this need to be".

Date: Sat, 28 Oct 2000 10:13:54 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] MX-1487 Adapter

The labeled CG-409/U are labeled as 5" long. One is made of Amphenol RG-58C/U. The other does not have anough maker label to tell. 5" of RG-58 will have about 14 pf shunt capacitance. When the series coupling capacitor is 56 pf, that has a detectable effect on level at any frequency, a greater effect at 32 Mhz than at 1 Mhz. We are talking 20%, not 20 dB. 3' of RG-58 would have 87 pf shunt C and would be 1/8th wavelength at 32 MHZ, in a high Z (150 ohm) circuit it could cause more than a few %, likely a few dB difference in signal to the receiver for the same indicated signal generator output.

Date: Wed, 03 Jan 2001 12:36:01 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] R-390A Manuals and O-Scope

Tek 465. Maybe HP 1740. You've never had a scope before.

Date: Wed, 3 Jan 2001 13:49:46 -0500
From: rbussier@lexmark.com
Subject: Re: [R-390] R-390A Manuals and O-Scope

Great subject for a new thread..... IMHO.... The Teks are very plentiful, useful and best of all cheap. I won't mention about the whole dumpster full of mainframes and plug-ins we threw away here at work. And no, you couldn't have anything. Instant dismissal. Most of the time we sell the surplus like that for scrap (by the lb.). I guess that was too much trouble. Gee, IBM had money problems? I wonder why. I'll bet the shipping charges on the old Teks will be more than the scope costs. At Dayton there were a couple of guys selling tons of equipment and they still had most of it on the last day. Don't think the average

guy is too interested in the old test equipment, as compared to all the new wizz bang DSP radios.....There is a surplus dealer near here that has a couple of our old Tek 'room heaters' with the manuals, etc. Even has the department stickers on 'em, no charge. ha ha But at $300 he's had them for years..... I doubt if he paid much for them..... I have a Tek 466 and it's small size makes it handy. I call it a 'lugable' not a 'portable'. One of the guys here just got a Fluke handheld 'scope meter.....pretty cool.

Date: Wed, 3 Jan 2001 15:01:03 US/Eastern
From: n1udi19@idt.net
Subject: Re: [R-390] R-390A Manuals and O-Scope

In reference to your question. If you are looking for or want to invest in a Tektronics. May I recommend the Tektronics model #453. It's the last of there tube scopes but a real work horse. Mine has been with me over 20 years. I have 3 Tekies model #502 and #555. The 453 is my favorite,the screen is small and square so that might be a problem if your looking for a big round screen.

Date: Wed, 3 Jan 2001 15:40:53 -0500 (EST)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] R-390A Manuals and O-Scope

I watched 465 scope prices for awhile on eBay, and bought several there. Roughly speaking, working 465 scopes seem to be $125, working 465M (military 465 with dual timebase?) for maybe $150, and 465B (dual timebase, also has auto 10X probe light) for maybe $200. I picked up a working 465M for $117, a broken 465B for $160? or so, a working 475M for $210, and a working with numerous good 10X probes for $180. I'm sure you can do better, but you can do a lot worse, too... Be careful to watch the descriptions - if they don't show two traces with signals, assume the scope is DOA and move on to the next scope, unless you are looking for parts, and the price is low. I also think you should ignore claims about being in current calibration unless they are a reputable shop with a guarantee. I know they also have DM44 add-ons (voltage measurement, period measurement of some sort) and other models of scopes, 475, 475M, 466, and so on, not to mention all the 7xxx series scopes, which I have to say, are rather large. In retrospect, I'd only get one of those if I knew I wanted to get a 7L5 frequency analyzer (which I do want...).

Date: Wed, 03 Jan 2001 16:10:20 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Tek Scopes

All 465 were dual trace, 10X light, and delayed sweep. The M is a sturdier and better shielded package. I don't recall the A, the B is a later vintage. All 5 millivolts maximum sensitivity 100 MHz. The HP 1740 is virtually identical, some say easier to use. The only specification difference is that the 1740 shows three

traces when displaying the external trigger input and the 465 shows only the external trigger input. Their selling prices were also identical. The 10X light is triggered by a pin on the ring of the BNC connector on Tek probes. There were 475 and 475A. The 475 is like a 465, dual trace, delayed sweep, but 200 MHz (flat to instead of 100 MHz for the 465), and 2 millivolts sensitivity. The 475 sacrificed the 2 mv range for another 50 MHz bandwidth so was 250 MHz.

The scope tube on the 465 is brighter and more suited for seeing one shot events even under bright lights. The 475 tube is not as good for that (and mine was new when I bought it). I have no experience with the 485, a 400 MHz bandwidth scope, too pricey when the 475 works there, just isn't calibrated well. Nor the 466 storage scope. All these are analog scopes. Its good to find the matching Tek probes, they work better than the after market probes but were expensive when new. My 475 has not been perfect. I blew a thin film input attenuator module once playing with high voltage, a diode bridge in the power supply failed, and a plastic clutch in the delayed sweep switch crumbled. Tek wanted $375 for the whole board, wouldn't sell the $15 part, so I carved a new clutch piece from aluminum and it works fine.

Date: Wed, 03 Jan 2001 17:22:52 -0500
From: "Phil (VA3UX)" <phil@vaxxine.com>
Subject: Re: [R-390] R-390A Manuals and O-Scope

Both good recommendations Jerry. Both are relatively cheap now and are good performers. Anything by Tek is good and nearly everything by HP is good too. Bear in mind that neither company supports the older instruments anymore. You should be able to get decent 100 Mhz scope for $100 to $200 on eBay. I'm referring to the Tek 45X series.

Date: Wed, 3 Jan 2001 19:33:45 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] R-390A Manuals and O-Scope

Anybody have any experience with the Tek 564 storage scope? Don't ask me why I'm askin'. Oh, well, if you insist. I paid 50 bucks including manuals for the mainframe and two plug ins plus a probe some time ago. It's been waiting for me -- to do what, I'm not sure -- maybe to capture a plot of my EKG for posterity before I flatline. ;-)

I also have a matched set of Tek "Electroluxes" -- T-922's, plus the rack mount version which the gov't. saw fit to buy at one time. My understanding is that these are not exactly the pinnacle of Tek's past product line. Also, the blue ones don't have much suction -- only about 15 mhz worth.

At least the knobs aren't broken on those. I have a couple of HP's -- a 100mhz (1701B) and a 200mhz (1710B) of more recent vintage but the triple concentric knobs are broken. These weren't abused, the knobs are just plain flimsy. Is there a place to get replacements on these? Not to mention a Nicolet 1090, one of the first digital storage scopes with a bandwidth to prove it (one or two mhz). It wins hands down for most chrome. Also a Tek 453 (50mhz), and finally a WO-33B, which wins for cuteness, hands down. Of course, it would be better to to have just one or maybe two better units, I suppose, but then, I didn't spend it all in one time in one place. Most of these cost less than a good probe. What gives with probes anyway? I know they're precision made, but ... ? Ooops, forgot one -- that RS scope probe thing with the little LCD screen on the side, but you hook it up to a PC for real readings, if that so. Anybody ever work with one of those?

Date: Wed, 03 Jan 2001 18:56:05 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] R-390A Manuals and O-Scope

I differ on a couple details. The 45x Teks were not the quality or the performance of the 465, 475, 485 era. And NO HP scope before the 1740 had comparable performance to any Tek scope. The HP 1740 was their first decent scope. All prior HP were hard to use and had tiny CRTs compared to the superior Teks. The electronics labs at ISU were equipped with the 1740 because they were easier to teach engineering students to use than the Tek 465 though they could have bought either for the same price. I've a bias towards Tek scopes from using 543 and 545 for a long time. But those aren't movable without a couple army troops or a couple mules. I can move the 475 and paid for it hauling it to customer's locations even when I was only looking at 60 Hz power problems. Yes it was overkill, but I considered it a really long term investment. And it has been serving me for at least 23 years and isn't yet obsolete for my needs. Though it would be a little slow for troubleshooting a 1.4 GHz computer, but I'll do that by the computer's guts not a scope anyway. The maintenance man for the labs felt the 1740 were more modular and so were easier to maintain, though I've found the 475 is fairly modular and fully accessible while working when troubleshooting is needed.

Date: Wed, 03 Jan 2001 22:24:21 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] R-390A Manuals and O-Scope

Tek 564... I don't think I want one. The main frame bandwidth is only 10 MHz. The storage scope was a pain, the tube expensive and prone to failure. ISU's labs that used 561 (before they went to the HP1740) found them very sensitive to humidity. If left all summer in unairconditioned labs, and fired up without drying they would consistently blow high voltage power supplies. If dried for a week in an airconditioned office they didn't blow the power supplies.

The normal gain of the input probably isn't great enough for an EKG though there probably was a narrow band super high gain plug in with that capability.

The coax cable for a probe has lower capacitance per foot than any other cable. That's achieved by using a hair for a center conductor and foam for insulation. The hair is made of the best quality steel or some tough alloy that can't be soldered. Then for the attenuator probes, there's a 10 meg wide band resistor with a fixed capacitor in parallel plus another variable capacitor (usually) at the connector end for matching the RC time constants of the scope plus cable to the probe and its capacitor. In some probes the adjustment was at the probe tip. Only a few manufactures make good probes. The resistance of that center conductor confuses bandwidth.

Date: Wed, 03 Jan 2001 23:29:31 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] R-390A Manuals and O-Scope

For the money, It would be tough to beat the full size Tektronix 7000 series lab scopes right now. They're a bargain and a hell of a lot easier to work on than the little compact models. Usually a lot less expensive too. Most of the 7000 series scopes I've seen were in a lot better condition physically since they weren't really "portable" and banged around a lot. I've standardized on the 7704A for now. I've got two that I use as my primary scopes and one with a dead PS for parts. I guess that I've got a couple of dozen working plug-ins for them and another dozen for parts. With a bit of luck, these should take care of my scope needs for long time.

>I've a bias towards Tek scopes from using 543 and 545 for a long time.

I've been using my NASA surplus 547 for a long time. When I think "scope" I think Tektronix.

>But those aren't movable without a couple army troops or a couple mules.

Not that bad. It's got two handles. <grin>

>I can move the 475 and paid for it hauling it to customer's locations even when I was only looking at 60 Hz power problems.

I like using a little Tek 503 for power/audio use. Only about a half a meg in bandwidth but it's cute and has a very bright and razor sharp display. Using it in direct sunlight is not a problem. I like the tube input vertical amplifier when screwing around with voltages above line voltage too. Much more forgiving. :-) One thing I like about the old 500 series is the brightness and sharpness of the displays.

I learned a long long time ago is that you should never own just one scope. If it breaks, it's a hell of a lot easier to fix if you have another scope handy. Been there and done that with the time base in the old 547.<grin>

Date: Wed, 3 Jan 2001 21:48:17 -0800
From: "Wayne Rothermich" <rother@impulse.net>
Subject: Re: [R-390] R-390A Manuals and O-Scope

I have a Tektronix 564 and also the Radio Shack probe scope. The 564 has only 10MHz real-time bandwidth, even when you use the fastest plug-ins, and it uses relatively early storage tube technology. The storage writing rate is only a few hundred centimeters per millisecond - about 3 orders of magnitude slower than later small scopes like the 464. Also, the contrast and brightness of the stored trace is low, and the storage mode tends to be a bit finicky to set up for a good clean capture. There was a variable persistence option available on some of the 564Bs, which is useful when viewing repetitive signals at a low sweep speed, like 50ms to 1s per division. One unusual feature of the 564 storage tube was that the upper and lower halves of the screen had independent controls for storage and real-time display. This capability made the 564 ideal for storing a reference trace on the top half and comparing it to other traces displayed on the bottom half.

I think the 564 is a good, but limited bandwidth, scope when not used in storage mode. The storage mode works, but it is crude compared to later scopes, and can't capture risetimes faster than a few microseconds or sine waves faster than a few hundred kilohertz. It is (relatively) small and light for a vacuum tube scope, and sampling plug-ins (3S1 and 3T1) are also available that will let you view repetitive signals into the gigahertz region. If you can find the 3S7 and 3T7 plug-ins, you can have time domain reflectometry capability as well. But list members who might be shopping for a scope should keep in mind that the later 46x scopes offer vastly better general performance at prices not dramatically higher than a 56x mainframe plus a few plug-ins. A $150 Tektronix 465 is what sits on my bench, and it does almost everything I need from a scope. The RS probe scope works well enough for some basic measurements, but the small pixel count (16x32) on the built-in LCD display limits the measurement resolution when used without an external display. You get better resolution (6 bits) when connected to a PC, but I find it cumbersome to use a PC to display scope waveforms on the bench. Bandwidth is 5 MHz, there is only one channel and adjustability is limited. It does have several nice digital scope features when connected to a PC, and it also has a DVM mode (AC and DC volts, but not ohms or current). I think it would be good as an ultra small scope for travel and also for use in locations without AC power - if it were teamed up with an existing laptop and a good set of batteries. If you ever need to troubleshoot equipment mounted on top of a tower, this is the scope to take with you on the climb up ;-)

It's a fun tool to use, and I would buy it again just for the novelty value, but I think I'll keep that 465 on the bench.

Date: Thu, 04 Jan 2001 10:16:04 -0600
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R-390A Manuals and O-Scope

>Anybody have any experience with the Tek 564 storage scope?

Yes, a small bit. I have an RM 564 here that worked when I put it waaaay back in the Junque Boxe about 7 years ago. Some observations:

1) The 651 is very simple in the chassis areas: all the real guts are in the plug ins.. the 564 main frame is more complicated, for sure.

2) Power supply: high voltage in particular: most troubles show up here. DAMPNESS is your enemy. Was it Dr Jerry or some other fellow who taught at an EE school: they had to get all the 561's out of storage two months prior to expected use and into the dry air conditioned spaces, to dry out before they were run.. Otherwise, they would simply not work. I have a 561 that I like a lot, but its trace is gone.. its on the to-do list!

3) Fan.. Noisy. Maybe a modern fan would be better. you got to have a fan in it though.

4) Plug-ins. There is one vertical plug-in that uses a hard-to-find compactron. If yours works, fine. If not, buy cast-off plug-ins for the tube. EAS wants $45 or so for the tube. The plug-in uses two. 5) CRT's: The 564 CRT is, of course, unique. If it's blown, find another scope. They are reported to have only moderate life. My RM561 has been my work horse scope here for a long time. The knobs are big enough to see and get hold of. Since it is the rack mount version, it's flat, not too high, and supports any heavy thing I care to put on top of it. (An RAL receiver, for instance.) Too bad its trace is gone. I have what may be a pulled HV transformer here (got to check part numbers). If it's the right one, I may soak it in dry air with dessicant for a month or three and put it in.

From: "wb5hak" <wb5hak@prodigy.net>
Date: Thu, 22 Aug 2002 21:52:27 -0500
Subject: [R-390] Manuals

Does anyone on the list need a nice set of manuals (Technical, Service, and Operators) for the AN/USM-488 scope made by tektronix?? I have the set, and anyone who needs it can have it for postage reimbursement. In EXCELLENT shape, and a shame to see just sitting here. 73, Don, WB5HAK

From: "wb5hak" <wb5hak@prodigy.net>

Date: Thu, 22 Aug 2002 22:11:17 -0500
Subject: [R-390] Manuals Gone

Subject says it. One list member is FAST, hi.

Date: Thu, 5 Sep 2002 06:05:34 -0700 (PDT)
From: Rodney Bunt <rodney_bunt@yahoo.com>
Subject: [R-390] Manual for Tek 475 Scope ?

Anyone out there have amanual for a Tektronics 475 Oscilloscope ? Or better still, a link to site that has a pdf documet etc....(Government releasd document) I have a dead power supply....

Date: Thu, 5 Sep 2002 10:14:22 -0500
To: R-390@mailman.qth.net
Subject: Re: [R-390] Manual for Tek 475 Scope ?

Go to http://www.logsa.army.mil/etms/find_etm.cfm and download TM 11-6625-2735-14-1 OSCILLOSCOPE OS-261B(V)1/U (TEKTRONIX MODEL 475 WITH OPTION 04). There are schematics in this document.

From: "Drew Papanek" <drewmaster813@hotmail.com>
Date: Wed, 21 May 2003 15:49:18 -0400
Subject: [R-390] B+ Dropping Resistance (was Drill a Hole...)

"Anybody nostalgic for a 535/545 series scope? I have 5 of them."

That's a little too much nostalgia for me (I already have a 535). The Tek 535 is a fine scope, works pretty well even by today's standards and is a must-have for boatanchor enthusiasts. If it does nothing else, with its half a kilowatt power consumption and big cooling fan it makes a good space heater.

" Well, Tek used a number of regulated supplies and all were based on the value of the -150 volt regulator [Warning - Do not adjust -150 unless you are prepared to realign the entire scope]. This was reason enough to delay the application of high voltage."

Drift of -150 supply (and moving those other regulated voltages along with it) and failure of a decoupling resistor or two is all the trouble I've had with it over the past 15 years or so. Use a DVM to set -150 and then the adjustment will be repeatable. If you don't have silver solder for the ceramic terminal strips then cut leads close to defective part and then splice to replacement part. <snip>

From: "guido" <laffitte@prtc.net>
Date: Tue, 8 Jul 2003 23:54:47 -0300

Subject: [R-390] R390A test rig

The OS8/U oscilloscope appears as part of the test setup in the original R390A manual with the URM 25D signal gen. Upon working on several OS8/Us, I have found that the usual culprits in most malfunctions are the multiple section electrolytic caps of the power supply. Replacing them brings back the little 3" scope as good as new. Of course any paper caps especially in earlier models should be replaced but always go after those filters first. Just a note for those who like to see some action on the CRT while operating the R390A or nonA or would like to use it in an original test set up. Take those scopes out of the storage and get them to work. The little devils have a lot of life left in them for years to come and they look quite nice beside our beloved 390s.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Date: Tue, 23 Sep 2003 08:11:38 -0500
Subject: [R-390] OT: Tubes needed for TEK561A

I dragged the scope out for something this past weekend and the vertical amp has developed problems. I checked the tubes and both 6DJ8s (EC88?) are very weak. Just my luck -- these are apparently popular with the audiophile gang and, thus, they can be pretty expensive. Anyone have any good suggestions on an inexpensive source for these? Hopefully the problem is with these tubes. I have zero experience troubleshooting scopes. Fortunately, the module is not complex so it might be a simple case of finding a bad component and replacing it (of course using the appropriate silver solder (which I will also need...sigh)).

From: "Dennis L. Wade" <dwade@pacbell.net>
Date: Tue, 23 Sep 2003 07:46:03 -0700
Subject: Re: [R-390] OT: Tubes needed for TEK561A

If you haven't found it already, you might try the "TekScopes" list on Yahoogroups. There are some true experts hanging out there. I have a 545A and a 531...but no spare tubes. Luckily, I haven't needed them yet. These scopes just keep going, and going, and going.....

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] OT: Tubes needed for TEK561A
Date: Tue, 23 Sep 2003 09:51:52 -0500

I'll probably have to join that group (if they'll have me). This group, though, is pretty amazing. Within 45 minutes of posting, I have two businesses with the tubes for $8 each as well as some "I have some tubes I'd be glad to send you". My initial search turned up some of the more expensive European brands at $20+ each and that's what I was trying to avoid.

From: "B Riches" <bill.riches@verizon.net>
Date: Tue, 23 Mar 2004 08:30:33 -0500
Subject: [R-390] Test equipment repair

Any idea of a person that repairs Tek scopes. I remember seeing a name of someone in the Midwest??

Date: Tue, 23 Mar 2004 16:27:45 +0200
From: "Bryce Ringwood" <BRingwoo@csir.co.za>
Subject: Re: [R-390] Test equipment repair

If you fancy doing it yourself, see TekScopes@YahooGroups.com Look for "Stan Griffiths" on Google. The older Tek scopes are nice to work on and have really good manuals. I don't know if yours is old or new. Hope this helps - Bryce

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Date: Tue, 19 Oct 1999 13:45 -0700 (PDT)
From: rlruszkowski@west.raytheon.com
Subject: Re:[R-390] AN/TRM-1

>AN/TRM-1 Has anyone used one of these? I acquired one a while back and intended to use it to help align my R390A. Although it isn't the URM25x, does anyone know if it is a good enough unit? I have considered selling it in lieu of buying a 25, but I might keep it if it will do the job. I guess what I'm asking is "does it suck for aligning the 390A"? Thanks, Barry - N4BUQ

Panic Not. If it radiates energy on a single (narrow spectrum) frequency and you can zero beat it against the BFO its good enough to align the receiver with. The TM goes on and on about signal levels. Worry not. Do a relative test. Measure the signal plus noise to noise. do a change. Measure the signal plus noise to noise again. Compare the two values. Your change either improved your signal plus noise to noise or it did not. Undo the change if necessary and go on to the next item you have on the fix it list. Remember the alignments in the RF bands are to get good flat response across the band. At a flat response the exact point of test is not a do or die issue. Run the receiver to the recommended frequency. Set the BFO to zero. Inject a signal and tweak the generator as close to zero as you can get. Adjust the power level to a mid scale test meter reading. Roll the KC know to peek the receiver to the generator. Reset the power output to a mid scale test meter reading again. tweak the adjustment under alignment. Remember that for the crystal oscillators in the converters you are going for max. output for the whole megahertz band. So a specific frequency is not relevant in these adjustments. The two places in the receiver where you would like real accuracy is to get the BFO to 455KHz and the PTO as straight and spread from 3.455 to 2.455 as you can manage. These two events are a once only alignment. Once the BFO gets set to 455 scribe a mark on the shaft at the chassis. If you ever lift the chassis then mark where the shaft couples to the inductor inside the IF chassis. You will find your PTO band spread the first time

you do a zero calibration and role the KHZ know from end to end. If its less than 5KHz just leave it alone until you can borrow a frequency counter for an after noon. Again once you get the PTO spread down to 10 HZ or so and flat as you have the time and persistence to work it, then it will not need attention again until it grow a 1000 cycles off on the spread and is usable (very good usable) out to 5000 cycles. If you change the 5749 in the PTO you may have to change the PTO to KC shaft adjustment to get the dial over run centered again. A tube change will not be a reason to do a diligent realignment of the PTO internals. PTO's can would go years without needing alignment. Do not worry about the brand name on your signal generator or its model number. I have done alignments against stations near the alignment points on field equipment. After a ride over land things would bounce around. We would just tweak a loose slug back right in the rack. The thing that will get you the most out of your receiver is to practice, practice, practice. The second thing that will improve sensitive is tubes. Not new tubes. New tubes are more noisy than aged tubes. Old tubes are noisy again. swap the IF and RF tubes around to find the arangement that yields the best signal to noise ratio you can get. Realignment get the setting closer. Practice alignments gets you more skilled at setting the exact point that is the peak point. After you do the tube test and find the arrangement of tubes that yield the best performance, do the RF deck alignment about three times. The manual says go from end to end on a band until you peak out the band. That's once. Its an understanding and feel for your test equipment that is more important than any thing else.

Date: Fri, 21 Jan 2000 19:01:30 -0600
From: Randy Guttery <comcents@mississippi.net>
Subject: Re: [R-390] VTVM vs. DVM

Hard question to answer - because there isn't any "right" answer... There are consideration to entertain - then make YOUR choice: Most (modern) DVMs are far more accurate than (most) VTVMs. Most DVMs are harder to read - because unless the voltage to be measured is pretty stable - the reading jumps around all over the place. Trends, peaks (nulls), etc. are harder to "watch". 10M @ a couple of pf input isn't bad for either a VTVM or a DVM... so there it's a dead draw.

You mention measuring E208 et. al.... While a DVM might give you a more accurate "absolute" reading - a VTVM will give you just as accurate relative reading - i.e. if you're looking for an AGC problem in the chain - even if the VTVM is off a half volt - it will be off that same half volt at each test point... and you're looking for "the odd one out" most of the time.

A problem with some (particularly auto-rangers) is that they can change the load to the circuit without you being aware of it - and some can inject noise from their converters and other digital circuitry.

So it comes down to what you are trying to measure - and how much you need to be aware of the peculiarities of the meter you are using. These things taken together can help you decide what meter is right for you.

Date: Fri, 21 Jan 2000 22:32:12 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] VTVM vs. DVM

I've got a couple of "modern" digital meters, a Fluke 77 and a ten or twelve year old RS bench meter. I mainly use these for messing with solid state stuff like diode voltage drops, etc. About the thing that I use them for in the boatanchor department is measuring resistance values. The RS one is handy for testing the gain of transistors.

I've never been a big fan of digital meters. I suspect that it's something about the changing flashing numbers, the beeps, and the flickering display strikes a raw primal nerve in me. Most of them have a sleep mode that causes them to shut down after a while that irks me too. Nothing like probing something and looking over and seeing that the display is totally blank because it's "sleeping". Where's my claw hammer? <grin> The meter that you have should work fine for what you want to do. You should consider it as a "start". You might want to keep your eyes open for good deals on older analog meters for your bench though.

I use a couple of NASA Michoud surplus tube type Hewlett Packard analog meters that I've rebuilt and calibrated as my primary BA bench meters. Both of these are available today for pretty much next to nothing up to say $25.00 each.

The 400H is used for measuring AC voltages with frequencies up to about 4 MHz. Max voltage is 300 volts and on the lowest scale, FS is 0.001 VAC.

I use the 412A for measuring DC voltage, resistance, and current. It'll handle a max of 1 amp as far as current and has FS ranges from .001 VDC to 1000 VDC. For resistance, it'll measure up to 5000 Megs and is very handy when looking for leakage and insulation failures in coils and transformers, etc.

A lot of super high quality older instruments are available pretty reasonable for making more precise measurements. I've got a pair of Leeds and Northrup resistance bridges that are slow as hell to use with their galvanometers but will measure down to a thousandth of an ohm. Weren't you always curious at the resistance values of the test leads for your meter? <grin> Both are still well within their accuracy specs of 15/100 of a percent. Pretty slick for oak boxed gear that looks like it's out of the 1920's. Actually, these are mid 1960's vintage. I paid 5 dollars for one and 10 for the other. NASA Michoud and Stennis Space Center had pallet loads of these things selling for dirt 15 years ago. I was told

that they were used for measuring the resistance values of harness connectors and harness wiring in the Saturn V sections that were build here.

For really accurate measurements of relatively constant DC and AC voltages, I use a Fluke 893A differential voltmeter. A thousandth of a volt is not a problem on the low end. This meter is very handy for checking and calibrating panel meter and test equipment meter movements, etc. with nothing more than a battery, and some resistors and pots. It's good for about 1100 volts AC/DC. I don't have the manual handy but I think that the accuracy is along the lines of a hundredth of a percent. Pretty slick piece of gear for $25.00 or so. This one is "pretty" and a recent addition and makes the fourth one I've owned. I picked up three of them ten years ago for next to nothing. This type of lab instrument is rapidly being surplused out of the military and industry due to the fact that it takes time to use it and you have to pay attention to decimal places, the null meter, etc.

For AC voltage and AC and DC current measurements, especially varying ones I've got about a dozen or so different Weston portable lab meters. I've got them from 10 ma. FS to 50 amps FS for current an up to 750 volts FS as far as AC voltage is concerned. The average accuracy of these is about a half of a percent FS. I've got a couple that the cal sheets show at about a quarter of a percent. I picked these when they were surplused from Onan up North. I bought them all. The average cost on them was only about seven or eight dollars apiece plus shipping.

One of the main reasons that a lot of the older lab gear is being sold off by companies is that the newer gear is so much easier and faster for the average person to use. There is a lower chance of operator error and resulting incorrect readings. In addition the calibration of an analog equipment is very slow and tedious. You can easily spend a couple of hours on with the HP meters mentioned above or on just one of the Weston portable lab meters. A lot of the new digital lab gear is calibrated via software. Type a couple of commands and it's done, perfectly. Some of this gear can actually monitor it's calibration and will shut down if it's outside of certain parameters. A lot of it has an internal clock and will shut down if not run thru the calibration checks every "x" period of time.

When you consider that a lot of places have regular calibration rituals that they follow every 3 or 4 or 6 months, over the course of a few years, the calibration costs and labor for old gear easily exceeds the value of the gear itself. Over the last few years, I've been putting more effort into picking up and restoring test equipment that I have than looking for new radios to ad to the menagerie. Old test gear can be a lot of fun to play with. I picked up three pieces at the last hamfest. I bought no radios. Oh, speaking of which, I picked up a real dog looking TS-505D VTVM for parts for nine dollars. I've got one packed up around here some- where that needs some shunt resistors that I haven't found yet. At

any rate, I checked this one out and it pretty much worked. After a half a bottle of 409 and a roll of paper towels, it looks pretty good. I spent some time fixing the sticking meter movement and replacing the leads and a few tubes, etc. I'm looking for either a complete manual or at the minimum, the calibration instructions, if any of you happen to have them. Paul, there's a mess of good stuff out there but you have to really shop around. Some people are still trying to get hundreds of dollars for gear that others want twenty dollars for.

Date: Tue, 01 Feb 2000 09:57:50 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Synthetic Oil / Tektronix 190B

<snip> >Does anybody have opinions on or experience with the Tektronix 190B signal generator?

I fixed a couple of 190's for friends years ago when NASA Michoud dumped a mess of them as surplus. I don't think that they were the B model though. I think that they were A's. They were pretty simple to work on. The biggest problem was that almost all of the tubes were flat in them. Also, one of them was missing the output cable and remote attenuator. We never could find a replacement short of a new one from Tek which was hundreds of dollars back then. Make sure that if you're going to buy one it comes with the cable and attenuator. You need to watch some of the older Tek gear that used lots of large selenium rectifiers in the regulated power supplies. I don't remember the 190A's having them so you should be OK with the 190B. It's been a long time so you might want to verify it before you buy one. My 50 MHz Tek 180A time mark generator has them. The filter caps are in good shape, the power transformer primary taps are correct for my line voltage, I keep the cooling fan and filter serviced, and the rectifiers run real cool so I haven't gotten around to replacing them. I managed to find a copy the Tek service bulletin on converting the 180A to SS rectifiers and picked up the dropping resistors and stuff that I'll need to do the conversion but just haven't gotten around to doing it.

Date: Wed, 15 Mar 2000 22:38:14 -0600
From: "Jerry G. Kincade" <w5kp@swbell.net>
Subject: Re: [R-390] frequency counter

Re: picking out a freq from many others (AND simultaneously accurately measuring its level) without owning a spectrum analyzer:

I was the lucky finder of a couple of nice condition working HP-312B Frequency Selective Voltmeters recently. I'm embarassed to say I paid $10 each for them

from a surplus computer dealer who didn't know what they were (in all fairness to me, neither of us knew if they worked at the time - found later that they both worked fine). Kept one, swapped the other to a friend. Never used one of these before, am extremely pleased with it. Set bandwidth desired (down to 50 Hz), choose mode (AM, CW, USB, LSB), tune it across the freq range of interest (bandswitched in 1 mHz increments) using its built-in LED digital counter, find the peak on the meter, and viola! a direct reading freq counter/VTVM/all-mode receiver w/precision step attenuator in volts or dbm down to -110 dbm. It has a full receiver chain w/audio stage built in - plug in a set of phones and an antenna and listen directly to the ham bands (up to 18 mHz), but seems less sensitive at the far end of the pipe than a normal receiver, I suppose mainly because of minimal IF stages included. It is within 20 Hz of my HP-5328A counter in freq accuracy, extremely stable (moves less than 50 Hz in 24 hrs from a cold start), and is built in the famous HP engineering overkill manner. This thing works great for verifying inputs and outputs of a mixer stage, etc. It should also be great for measuring filter bandpasses, although it does NOT have a tracking generator built in, so your sig gen, hand-cranked, becomes the manual tracking generator for "sweeping" a filter stage. Now that I've used it, don't know how I got along without one all these years. Drawbacks? About the size of an R-390, although about 1/3 the weight. And God help me if it ever craps out. On the other hand, it's run for 25 years so far and still works fine... Also, I haven't been able to find a manual yet, though it's so intuitive to operate, a manual isn't needed for general use. Trust me, if you see one of these at a reasonable price, GRAB it. BTW, this one isn't for sale.

Date: Thu, 16 Mar 2000 11:32:23 -0500
From: km1h@juno.com
Subject: Re: [R-390] frequency counter

Agree on the RS and clones with a different name. I tried one a few years ago to assist in repairing a TS-940 where I needed 3 counters to track the shenanigans of the PLL/synthesizer. The readings had a mind of their own. Finally borrowed another HP5245L and finished the job.

The Heathkit IM-2410 is a fairly decent unit and covers 10Hz to 225MHz.

An old favorite if you have bench space is the HP5245L which is a basic 50MHz counter. The 5253B plug-in will take you to 500MHz and others go to 12.4GHz. The 500 Mhz combo is often at flea markets for $50 or less. They seem to run forever. I have both the Heath and the HP and both do the job and have never given me grief. 73 Carl KM1H

Date: Thu, 16 Mar 2000 17:10:24 -0600
From: "Tom Lutz" <telutz@pclink.com>
Subject: Re: [R-390] frequency counter

You are correct, mine is the Radio Shack 22-306. You are also correct in that the sample size is somewhat small. But for what I use it for it works great. Usually I leave it hooked up to my URM-25 as a read out and I find it very stable and accurate against other standards.

Date: Sat, 21 Oct 2000 14:39:48 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] Tek Scopes...

>I have several of the large variety Tek (5XX) scopes in my 2000 sq. feet
>basement. I am able barely move around in the basement now as it is a true
>obstacle course made up of radios and test gear.

I know the feeling even with 12 foot ceilings. ;-(

>What do you recommend I do with the scopes? No way am I putting them
>on ebay or taking them to a hamfest, too big and heavy and relatively
>worthless except as for heaters in the winter.

Sad, isn't it. I remember being in awe of them during the 1970's. Hell, I still am. They are a prime example of the US at it's best. Quality engineering, quality components, and first class workmanship. Some of the best manuals of anything ever built too with schematics that I wish everyone had used. I still use a couple of my 5xx series scopes. Granted that since the 7000 series scopes started outnumbering them, their use has dropped. If it doesn't take two hands to lift and carry it, it's not a real scope. I played with one of the new cigar box digital scopes a few months ago. No thanks.

>I am sentimental
>as well as I used these types exclusively in the 60's. I would give them
>away if some one came to get them. Barring that, I am going to wind up
>stripping them and trashing the carcass.

Put together a list of what you have and post it in a few of the related lists and news groups and selectively strip them for the parts that people need to restore theirs and offer them at reasonable prices.

<subliminal message on>
Keep me in mind for a 547 CRT, a matched pair of nuvistors out of the front end of a late model 503, a diode risetime plugin, a transistor risetime plugin, and a couple of manuals I'm missing... <subliminal message off>

>I have about 150,000 tubes but I guess I could pull those if they have value.

It's sad but that's where the money is. ;-(

>That is, unless you have something better to suggest.

Hey, drop a note to Stan Griffiths at: w7ni@teleport.com He's a hell of a nice guy and has regular contact with probably the greater majority of 5xx scope fans on the net. I think that he's still running a discussion group on his website. You should be able to find other Tek collectors looking for parts there. He's sharp as a tack at running down problems too.

>I hate to do it but I am hurting for space.
>And, of course, I cannot store them in my 2 car garage either as we
>have not had any cars in there in about 8 years.

Cars in a garage? Why? <grin> I can't remember the last time the wife could park a car under cover. Come to think of it in over twenty years, she hasn't. I need more space.

Date: Sun, 22 Oct 2000 19:51:40 -0400
From: Al Solway <beral@videotron.ca>
Subject: [R-390] Signal Gen. HP8640B and HP8640B W/OPT 323

I am looking into buying a signal generator to align my R-390A. Is there a difference between the militarized 8640B with Option 323 and the standard 8640B. What should I be concerned about. Also the differences between the URM-25D and the URM-25F. One more question. On my EAC from Fair Radio Z501 was cunched bad enough to break the phonelik tube supporting the core and winding. I was able to repair the damage and cosmetically it is quite good. The DC resistance of the winding is 18.6 Ohms prior to and after repair. The Y2K Manual, Page 5-31 indicates DC resistance should be 4.8 Ohms. I believe that this is an error in the manual. Z503 which has a similar winding measures 18.7 Ohms. The Manual indicates the DC resistance is 18 Ohms for Z503. Need confirmation that my Z501 is OK before ordering another Z501.

Date: Tue, 24 Oct 2000 10:24:45 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Re: Test Equipment question

There is nothing wrong with the 410C that I know of, I hadn't noticed the C more available than the B around here.

Date: Fri, 24 Nov 2000 19:29:04 -0500
From: "Jim Brannigan" <jbrannig@optonline.net>

Subject: Re: [R-390] Multimeter

Any comments on the Hickok 1605M multimeter.... Fair has them listed in their current catalogue Would this item be a decent replacement for my tired old HP 410B?

Date: Sat, 25 Nov 2000 11:24:10 -0500
From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] Multimeter

The HP-410-B is one of the best "Tube" VTVMs ever made. The last of the series had a light gray panel and a meter with rounded corners on the glass. Nothing ever made by Hickok even comes close. Hickok gear was "service grade" whereas HP gear was "lab" grade. These units are a bit tricky to calibrate, as they require dual triode tubes with fairly closely matched sections. Usually a handful are required to get the "right" ones. Once calibrated, however, they will go for years,sometimes decades. Rebuild the HP, and forget about the junk from Hickok. If you really want to up-grade, go for the solid state HP-410-C. If you get one of these, make sure that it comes with its ORIGINAL probe. They are detachable, and matched to a particular unit. NEVER buy one without a probe, as you will never find one to match, and the AC function will be useless.

Date: Sat, 25 Nov 2000 12:11:57 -0500
From: "JAMES T BRANNIGAN" <jbrannig@optonline.net>
Subject: Re: [R-390] Multimeter

The Hickok offered is a solid state model. any info? Jim

Date: Wed, 29 Nov 2000 16:03:22 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] revised cal steps for MU-297/U (AN/USM-223)

Thanks much.. I'll carry out that calibration next time I have mine out. AND.. I have two of these things, one of which has had a field modification to help measure diode forward drops, I assume.. The change is fairly crudely done, and involves one extra resistor and an added front panel jack. Who has any details on that??

Date: Wed, 29 Nov 2000 16:00:23 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] revised cal steps for MU-297/U (AN/USM-223)

>Thanks much.. I'll carry out that calibration next time I have mine out.

One of mine had a bad trimmer so I'll get a round to fixing it when I get a chance and calibrate it, but the second is now on the money as far as calibration goes. Good think I kept the old tube type GenRad audio generator or I'd have had hell generating the 50 volts at 1000 hertz. <grin>

>AND.. I have two of these things, one of which has had a field modification to help measure diode forward drops, I assume.. The change is fairly crudely done, and involves one extra resistor and an added front panel jack.

I have one original one and one with the mod. Mine has a yellow jack and a red "D" engraved next to it in the front panel. I did a comparison while I had them both out of their cases for calibration and the on mine involved removing one of the original resistors and replacing it with two 1% ones.

I'd also like the info if anyone has it. I suspect that there's a MWO out there some where. does anyone have the DAM 310-* handy to see what the MWO number was?

Date: Thu, 14 Dec 2000 17:49:47 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Do-it-yourself TE Calibration

>Keep an eye out for small calibrators at surplus dealers. .....

I'd love to find some. :-) I've got and use test gear that spans from WWII to the early 1990's. Most of the stuff is way past it's prime as far as a commercial establishment would be concerned. This doesn't mean that it's accuracy potential sucks, it's just that the normal cost of commercial maintenance and calibration typically exceeds the value of the gear. A lot of the gear isn't really user friendly by today's standards and is slow to use like the Leeds and Northrup resistance bridge and the Fluke differential voltmeter. Anyone that has used a null meter type differential voltmeter or a galvanometer type decade resistance bridge knows precisely what I'm talking about. A modern digital meter will give you a reading in a fraction of the time. But, I can make accurate measurements down in the hundredths of a percent accuracy range with these. I don't know about you guys but I have a lot more time than money. <grin> I'll spend 15 or 20 seconds getting the reading rather than shovel out the big

bucks for an "instant" reading of the same or lesser accuracy. I've spent money for professional calibration of certain instruments of mine, sure. The Fluke AC/DC differential voltmeter cost me about 60 bucks for calibration. I only paid thirty five dollars for the instrument itself. The L&N resistance bridge was still well within specs and needed no adjustments. I think I bought my buddy lunch for testing it for me. I've got a recent 1990's ten digit Racal-Dana counter and a 1970's vintage SD counter that I dropped off to him. Both have optional "high end" time bases that still easily exceed the original specs. All I had him do to each of them was run them for a week and tweak the oscillator in each to the facility's standard. Total cost of two cases of cheap American beer. With the basics of resistance, voltage, and "time" covered, I can calibrate just about everything else that I need to use. It still amazes just how basic the three requirements are when you think about it.

Date: Fri, 15 Dec 2000 10:25:53 -0500
From: "AI2Q Alex" <ai2q@ispchannel.com>
Subject: [R-390] Instrumentation blues

All this talk on the thread about URM-25s (mine is exceptionally stable and certainly worth the $20 I paid for it) got me thinking again about one of my favorite instruments, a 1954-vintage Weston Model 785 Type 6A Industrial Circuit Tester, which is a VOM. It's a beautiful metal-encased instrument with a black engraved bakelite front panel, complete with impressive machined meter shunt and accompanying foot-square hardwood carrying case. It hails from the same era as my beloved Motorola R-390A receiver, which also carries a date tag of 1954. I had been using it as my reference "standard" whenever calibrating meter circuits in the shack, etc. but the bobbin seems to have opened up. I tested the movement's resistance, and although the meter springs are okay, the actual coil is open. I guess the years finally took their toll. Anybody have a meter movement or meter assembly for this VOM? Or even another Model 785 for sale or trade? Thanks.

Date: Sat, 16 Dec 2000 22:42:50 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] HP 410B/C VTVM probe tube ?

Its a tough act to accomplish. better than 1 KV PIV and better than 95% rectification efficiency up through a few hundred MHz. I've not found diode other than the 2-01C that works. Other tubes might work at reduced voltage but few are small enough to fit the probe without drastic RF performance destroying changes. Hunting for such a diode rapidly teaches one to be gentle with the AC probe and to never drop it on the floor. And makes the meter without one sell for pennies.

Date: Tue, 19 Dec 2000 01:12:06 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>

Subject: [R-390] TS-505* Electronic Multimeters

Recently played with a few TS-505's-- one TS-505B/U and a couple of TS-505D/U electronic multimeters (VTVM). They were used in servicing the R-390* and are referred to in the depot manual. I got interested in them mainly out of nostalgia, but find they are very cool units in their own right despite the modern-day digital gear. If you have one gathering dust for one reason or another, here are a few hints based on recent experience. Since I don't like to mess around inside our gear without having the manual handy, I got a very nice reprint from Robert Downs. Cost exceeded the TS's but was worthwhile for peace of mind alone. Main reason for acquiring the manual was for having calibration instructions at hand. Turns out this chore is a piece of cake. Here's how to calibrate any model TS-505:

DC ZERO DEFLECTION:

Open the meter and after warmup, adjust for DC Zero Deflection as follows.

1. With FUNCTION switch turned to +DC, set ZERO ADJ. control on front to its mid-range. Leave it there throughout all the following procedures.

2. Short together the DC and COMMON probes.

3. Set RANGE to 2.5V-Rx1 position.

4. Loosen locknut on R18 pot and turn gradually to suit. This is a rheostat wired in series with the filaments of tubes V1 and V2 that causes the meter to come around slowly. If you run out of range, try reversing tubes V1 and V2. Wait at least a minute for the meter to settle as close to zero as possible. Fine tune with the ZERO ADJ control.

5. Tighten R18 locknut and verify meter pointer is still on zero.

DC FULL-SCALE DEFLECTION:

1. Keep FUNCTION and RANGE at above settings and loosen R10 locknut.

2. Apply 2.5 VDC (+ or - 1%) across DC and COMMON probes and adjust R10 for full-scale reading. Wait and watch for one minute.

3. Lock R10, verify meter reading, then disconnect probes from DC source.

DC ZERO CENTER SCALE:

1. Turn FUNCTION to +/- DC position. Short DC and COMMON probes together.

2. Loosen R6 and adjust it for center scale reading.

3. Lock R6 and verify meter reading.

AC ZERO DEFLECTION:

1. Turn FUNCTION to AC.

2. Short AC and COMMON together.

3. Loosen R45 and adjust it for zero reading on meter.

4. Tighten R45 and verify meter reading.

AC FULL-SCALE DEFLECTION:

1. Turn RANGE to 5V-Rx10.

2. Loosen R12 and apply 5 VAC @ 60 Hz (+ or - 1%) across AC and COMMON probes.

3. Adjust R12 for full deflection.

4. Lock R12 and verify meter reading before disconnecting AC source.

That's it! (There is no calibration for the OHMS function.)

Closing thoughts: As with all vintage gear, replace the power cord with a three wire grounded. I ran into trouble calibrating my TS-505B/U to full-scale deflection. Tubes already had been tested. Next I checked the carbon comp resistors. R19 (82K) was way high and replacement of it plus a few others in the area that were out of spec made it possible to calibrate to full-scale. Typically these rugged and well sealed units are very clean inside and fun to work on. Check condition of the probe wires and see if there is still a 220 Ohm precision resistor inside the AC probe handle on the TS-505, A, and some B models. The C and D models require no resistor inside the handle.

Date: Tue, 19 Dec 2000 08:19:29 -0400
From: "Jeff Adams" <jadams@mcqassociates.com>
Subject: Re: [R-390] TS-505* Electronic Multimeters

I have a scanned manual on one of those in PDF format somewhere.

Date: Tue, 26 Dec 2000 04:41:53 -0600

From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] Free TV-7 series tube tester settings file

Yeah, it's ready for public download after lots and lots of very tedious work. The current version is beta .90 and yes, there are some more things I plan to add to it in the future. I feel confident that it's the single most comprehensive listing of settings data for the TV-7 series of military tube tester known to man. Best of all, it's free. <grin> You can download it from the TV-7 page on my website at: http://www.acadiacom.net/nlee Settings files are also available for the I-177 and TV-2 series of mil tube testers on their respective pages at my site. Again, for free. Please take the time to actually read the TV-7 page before you download the beast. Holler back if you spot any errors or have any reference material that wasn't included in the file. Also, I'd appreciate it if any of you that have links to my site for the I-177 and TV-2 series data would update your description to include the TV-7 series. My next project will be settings data for the TV-4 and TV-4A tube testers. I'm still looking to round out the info that I have. Holler if you have a TV-4 series and what if any, documentation you have for it.

Date: Mon, 26 Oct 1998 23:06:44 -0500
From: Gary Kaufman <gkaufman@bu.edu>
Subject: [R-390] Lytic cap replacement, one more viewpoint.

I'd suggest the use of an ESR meter on the electrolytic caps, and careful measurement of leakage (I use both an Eico 950B and Sprague TO cap tester) at true working voltage + 20%. If the ESR is <3, electrical leakage minimal and the physical condition good I'd continue to use the caps once they are properly reformed. If the ESR is up or the leakage doesn't drop off in about 4-5 minutes I'd get out the Dremel and rebuild the cap! For those of you who don't have an ESR meter - it is the most useful repair instrument I own. Especially for "newer" equipment with loads of poor quality electrolytic caps (my Panasonic VCR immediately comes to mind...). Mine was a kit from Dick Smith Electronics in Australia and was only about $35. You can go thru a small PCB full of caps in a few seconds, and identify likely suspects for quick replacement. It is also great to carry at hamfests before buying lytics.

Date: Fri, 19 May 2000 23:05:43 -0700
From: "Wayne Rothermich" <rother@impulse.net>
Subject: Re: [R-390] Instruments

> I am wondering about test instruments. All of My old manuals call for the use of a VTVM. I can get numerous old HP VTVM's at the swap meets. My question

is this; do I need a VTVM to properly read the voltages in My old stuff, or will a modern multimeter meter do the trick. If so
> what brand (s) would you suggest. I have burnt up My last Radio Shack piece of junk.

I think all those manuals specify a VTVM so people won't use a VOM to measure AGC voltages. Most VTVMs have a constant 10 or 11 Megohm input impedance (HP is 100 Megohms), while the input impedances of VOMs vary with range (and price), and are usually far less than this. This lower impedance can load a high-impedance circuit and pull the voltage down, producing an inaccurate reading. Also, most VOMs are easily damaged if overloaded, and many will not survive being dropped.

Most modern DVMs have a 10 Megohm input impedance, similar to a VTVM. Thus these can be used in place of a VTVM, and will usually be more accurate as well. VOMs are still sold (by Radio Shack and others), and are still not a good choice for BA work.

I've used many types of DVMs, and most were more than satisfactory. Any name-brand DVM should serve you well. Price depends upon accuracy and features; most any DVM will make adequate BA measurements, so let your wallet decide.

One caveat - many radios have impedances on the order of one Megohm in their AGC circuits. In these circuits, 10 Megohms can be a significant load. This is usually not a problem, since AGC voltages can vary a lot just due to differences among vacuum tubes. If you need to measure accurately in these circuits, consider using a 90 Megohm resistor in series with your probe, or use a high voltage probe (which is also a series resistor) to raise the input impedance. Remember to correct for the voltage division that this creates. Also, lab-grade DVMs are available with much higher impedances (and prices). And there's the HP VTVM.

Date: Sat, 20 May 2000 02:59:59 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] Instruments

First audio plate voltage though 100K resistor. A 250 volt scale on a VOM like a Simpson 260 will be 250 * 20k = 5 megohms. At 150 volts the VOM will draw 30 microamps and through the 100K resistor, that will be an additional 3 volts drop. Probably not significant. Output stage grid voltage should be about zero across 470K. Leakage could raise it. Say it was raised 3 volts from capacitor leakage. That would be a current of 6 microamps. the 5 volt DC range of a VOM similar to a 260 would have a resistance of 100K. That would make the equivalent resistance at the grid 470K || 100K or 82.45K and that leakage current of 6 microamps would be hidden by showing only .5 volt on the VOM. The VTVM would show 2.87 volts. So the VTVM would show the leakage as significant while the VOM would make it look insignificant. A VOM could load down the oscillator grid test points and make them look defective when the VTVM would say they are not.

It all depends on the relative circuit and volt meter resistances. If you can do a rapid circuit analysis you can correct the VTVM indications for the indications of the VOM.

Some digital multimeters are confused by RF voltages on their DC ranges, so might give misleading readings on oscillator grid test points and mixer injection points. Digital multimeters, except for the rare Simpson with an auxiliary bar display, are rotten for alignment. First they are relatively slow to change, then the user has to interpret the readings to detect the peak instead of merely moving the needle for a peak. Real quick now, is 2.73 volts more than 2.37? and 2.32 and 2.83? Though the front panel meters can be forced to work for nearly all alignment indications, sometimes they are unhandy to see while keeping the alignment tool on the capacitor or slug needing peaking. And they are fairly small compared to the scale of a VTVM.

A Heathkit or RCA or Eico VTVM is a worthwhile restoration project (bad news if the ohmmeter battery has been left to rot inside) and adequate for BA troubleshooting and alignment. They are generally in low demand at hamfests and so don't bring much.

Date: Sat, 20 May 2000 06:51:44 -0500
From: Tom Norris <badger@telalink.net>
Subject: Re: [R-390] Instruments

>A Heathkit or RCA or Eico VTVM .....

Another recommendation is the **Simpson 269 VOM** -- it is 100K ohms per volt and has a meter face as large as a VoltOhmist with no AC cord to worry about tripping over. They pop up every now and again. We have them at work on every bench in the main lab -- been there since the lab opened in 1963-64 and except for a couple all are still in service and still to spec. They are one of the few examples of instruments that HAVE been there and in use as long, the only others i know of are some of the custom test jigs in the rocket test cells, some of those have been around since the 50's

Tom KA4RKT

(For the curious, I work at Arnold AFB/AEDC in the metrology lab [PMEL] Loads of fun every day and all the assorted test gear I can calibrate....)

Date: Sat, 20 May 2000 10:12:31 -0500
From: Randy & Sherry Guttery <comcents@mississippi.net>
Subject: Re: [R-390] Instruments

Ken - You've gotten some excellent answers so far - but one "point" hasn't been mentioned (at least I haven't seen it so far)- and that's "display response". When doing alignment - digitals can be real hard to "interpret" because you have to constantly evaluate the "reading" to determine the peak. An analog "needle" meter has a huge advantage - because it isn't constantly "changing" and it's very easy to see the "peak" as you tune through it. While I have an HP 410C on the bench (and IMHO it's about as good a VTVM as you can get at a reasonable price) - I also have an EICO 232 on the bench - which is very good for quick and dirty measurements. And as others have noted - these can be found at HAM fests, etc. for $5 - $15 dollars - often in really good condition.

Date: Sat, 20 May 2000 09:12:42 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Instruments

You're right Randy, But the analog meter will float so it has to be done slowly to get the highest part of the peak, then when the center of the peak is found the needle will sometimes go off the scale. I've found some peaks on the R-390A to be shallow and wide and others to be very narrow and high, and some can't be found until something else is peaked first. So if the receiver is way off it may take some hunting.

Date: Sat, 20 May 2000 18:43:31 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] Instruments

The Simpson 269 doesn't load circuit much, but every one I've used was slow as molasses in Canada in January. Extremely over damped which means you wait several seconds for it to ooze to a reading, and that slowness makes finding alignment peaks really tough. I have a couple in pieces, I think enough pieces to assemble a working one but I'm in no hurry to do that. For VOMs I prefer the 260 anyway. And for most VTVM applications I use my Tek scope.

Date: Mon, 22 May 2000 08:38:49 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Instruments

Odd that you should mention this. Over the weekend, I made a strange discovery. After replacing some fried resistors in my HP410B, when I went to use it on my R390A, it no longer worked. I set it aside for lack of time to fool with it. Well, I got around to fixing it this weekend (just a loose wire from the PC board). As many of you remember, I've been complaining about low output from my crystal oscillator deck. When I got the HP fixed, I measured the grid voltage at the test point and, lo and behold, instead of measuring -100mV, it measured close to -6V. Since I hadn't calibrated the meter, this reading was just a ballpark figure. While holding the VTVM on the test point, I stuck the DMM at the same point and the voltage dropped to about -100mV. This didn't surprise me as I would expect the DMM to load the circuit down. What DID surprise me, though, was when I stuck the VTVM and TEK probe at the same test point, the voltage dropped the same way as it did with the VTVM and the DMM. Is this normal? I thought the TEK would not load a circuit like a DMM. Is there something wrong with the TEK? I've been making these voltage measurements with it all this time and assumed it wasn't lying to me, however, apparently the HP proved me wrong.

I checked the accuracy of the VTVM and it is pretty far off. My 13.8VDC supply checked 11V on the 30 and 100 volt scales. This tells me the -6V I was getting at the test point is really closer to -7.5V which, depending on the crystal selected, is in tolerance (not sure about that).

It's been a long time since I used an analog meter and the HP is really nice. It makes me realize just how convenient it will be to peak the various circuits when I align my radio. Really smooth movement.

Date: Mon, 22 May 2000 10:52:17 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: RE: [R-390] Instruments

Both the DMM and the Tek probe are loading the circuit with capacitance (I am assuming you are using a X1 probe.) If you use a X10 scope probe, I bet it will not load the circuit. The added capacitance is causing the oscillator to die.. it is not just DC loading that you are observing.

Date: Mon, 22 May 2000 10:00:02 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Instruments

It's a switchable probe and I don't recall trying the X10 position. I'll see what that does. With the readings I was getting being so small to start with, I didn't attempt the X10 position.

Date: Mon, 22 May 2000 09:00:09 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] Instruments

The 10:1 Tek probe doesn't load things much, but the direct probe does load quite a lot. The raw scope input R is usually 1 megohm and then there's the coax from scope to probe tip. Tek makes a special low C coax but its still probably 13 or 15 pf per foot. Some Tek 10:1 probes do the division mostly in the box at the connector, so have a lot of capacitance on the probe, the better ones have a resistor (shunted with a capacitor) at the probe tip. The attenuating scope probe has to be adjusted for the ratio of the capacitors across the series resistor (9 meghoms for the typical 10:1 probe) and the shunt of the scope input (both scope circuitry and cable) to be the same as the resistive ratio. That's what sets the HF attenuation. And is tested by making a square wave look square through the probe. And the probe loading on the oscillator probably comes from that oscillator test point having RF on it.

You can calibrate the DC on the VTVM using a NEW (never loaded) C or D cell, probably not alkaline. Heathkits were calibrated by setting the new cell to indicate to a little red dot on the right side of the meter on the 1.5 volt scale, Heath claiming the new cell was 1.54 volts. A mercury cell was generally more predictable at 1.4 volts but new mercury cells are extinct. They leaked mercury into the environment when smashed between hammer and anvil. There is some loading of some circuits by the VTVM, but the normal voltage readings

charts were made with the VTVM so the loading effect is included. Using a different meter will lead to different readings that may NOT be wrong, just different from meter loading. I noticed some errors in the voltage charts of TM 11-5820-357-35 edition of 9 March 1962 for the R-390/URR where some places it puts the unregulated DC at 395 volts instead of the 295 it should be.

Date: Mon, 22 May 2000 09:57:57 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] Instruments

Switchable probes are often the worst at having lots of input capacitance on either range. Direct probes are guaranteed to have lots of input C.

Date: Sat, 10 Feb 2001 15:17:23 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] TV-10 settings for VR tubes...

OK, after spending several nights and a half a fifth of Rebel Yell, studying life in general, it appears that the settings used by the TV-3 and TV-10 series testers are identical. Why the settings data for voltage regulator tubes was not included in either the manual or roll chart for the TV-10 series tester but was included in both for the TV-3 series tester will probably remain one of life's great mysteries. The voltages supplied by the power transformers in both the TV-3 and TV-10 series testers looks to be the same. So, here's some settings that you guys with TV-10*'s can try. This is purely experimental so if you put an eye out or create a black hole and destroy your town or something, don't come bitching to me. ;-) The format is the same as the roll chart so I didn't bother to type the column headings in.

0A2 BLST KR0-3020 0 42 A P4 Volt.Reg. Read As Rectifier.

0A3 ---- JP0-5010 0 67 A P4 Volt.Reg. Read As Rectifier.

0B2 ---- JP0-5020 0 42 A P4 Volt.Reg. Short on 3. Read as Rectifier.

0B3 ---- JP0-5010 0 69 A P4 Volt.Reg. Read As Rectifier.

0C3 ---- JP0-5010 0 65 A P4 Volt.Reg. Read As Rectifier.

0D3 ---- JP0-5010 0 46 A P4 Volt.Reg. Read As Rectifier.

5651 ---- AP0-3070 0 56 A P4 Volt.Ref. Read As Rectifier.

5783 ---- AP0-3050 0 72 A P4 Volt.Ref. Read As Rectifier.

5787 BLST JP0-3010 0 67 A P4 Volt.Ref. Read As Rectifier.

5823 BLST AP8-3010 100 87 A P4 Volt.Reg. Read As Rectifier.

Holler back with your results,nolan

Date: Sat, 10 Feb 2001 08:40:27 -0800
From: keith <khgrant@ix.netcom.com>
Subject: Re: [R-390] Bathtub capacitor replacement

Good description. Sounds kind of messy! How do you measure leakage on this bathtub cap?

Date: Sun, 11 Feb 2001 05:57:23 EST
From: G4GJL@aol.com
Subject: Re: [R-390] Bathtub capacitor replacement

I used to use the leakage position on my transformer ratio - arm bridge. But that only tests at 10 v or so. I have adopted Dr Jerrys method of using a varivolt bench PSU and a 100Mohm input impedance VTVM . As a series circuit, it is described below:

Output of PSU goes to first wire of C under test.
Other end of C goes to VTVM input HIGH
VTVM LOW strapped to ground
Ground returned to PSU negative
PSU negative strapped to Ground

Your acceptance of what is or is not leakage will vary, but with Polyester tubulars that I use I can only 'see' the residual noise when the cap has stored its charge.....this is at about 10 to 15mV for 0.01 uF 400v rated Vishay Roederstein Poly tubulars at 1.5 times the rated voltage applied. Almost all BA caps are so leaky you cannot get down to these levels...you will see to PSU voltage build up across the "C' before you get any where near to the cap retaining a charge.

Date: Sun, 18 Feb 2001 14:47:19 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] TV-3 & TV-10 settings project starts

I have an affordable and working TV-10D/U in my possession now thanks to a fellow list member. That means that I've started on a settings file for the TV-3 and TV-10 series like those that I've done for the I-177, TV-2, TV-4, and TV-7 series tube testers. I just finished working up a parts order that I'll place later today. I'm going to replace the electrolytic and paper caps along with all of the carbon composition resistors in the TV-10D/U. The metal film and wire wound ones are all fine but a couple of the carbon ones have drifted upwards well out of spec. I'm replacing them with 1% metal film models. The meter movement tested accurate within .7% and the error is linear. I may or may not pull the meter apart and correct the error. As it is, or will be after I replace the caps and resistors, this tester has good potential as a test platform for compiling and testing the data. Since I was already involved in some research for a possible TV-7 to TV-3/TV-10 settings data conversion project, I've got enough information to get the project off of the ground. What I'm looking for right now is copies of any manuals or roll chart data for the TV-3 and TV-10 series that I don't already have. A current list of the materials that I have access to is posted on the TV3 and TV-10 page on my web site at:

http://www.acadiacom.net/nlee

Photocopies or scans are fine. Email me before you file attach any scans though. I'm not interested in anything that has been OCR'd. I've had rotten luck with OCR and settings data and the inaccuracies that result. On a side note, I've yet to receive any reports of errors in the public release beat of the TV-7 series settings file that I have for download. It's been a couple of months since it's release. Is anyone looking for typos?

Date: Sun, 18 Feb 2001 17:26:46 -0600
From: John Watkins <jwatkin9@swbell.net>
Subject: [R-390] British Tube Testers

I have noticed that a few folks are looking for tube testers, Don't forget that our British cousins also made some really good ones that have been available off and on over the years. I have a CT-160 made by The Automatic Coil and Winder Equipment Co. Ltd, Winder House London, SW-1 that works just fine. I picked it up while living in London. Does anyone have any of the documentation on this unit? I have a book that has the various setting for both European and American tubes. I guess that I should scan it and send it to Nolan as soon as I get the chance.

Date: Sun, 18 Feb 2001 21:05:03 -0500
From: Meir Ben-Dror <mbendror@optonline.net>
Subject: RE: [R-390] British Tube Testers

Don't forget to mention the British AVO MkIII tester - I think it's one of the best tube testers in existence. I have a TV-7 and an I-177 tube tester and also a few

flavors of the average commercial tube testers. The one I like to use the best is the AVO.

Date: Sun, 18 Feb 2001 21:08:25 EST
From: Llgpt@aol.com
Subject: Re: [R-390] British Tube Testers

>Don't forget to mention the British AVO MkIII tester - I think it's one of
>the best tube testers in existence.

Probably THE BEST.

Date: Sun, 25 Feb 2001 14:22:17 -0800
From: "khgrant@ix.netcom.com" <khgrant@ix.netcom.com>
Subject: [R-390] Tube Testing Question

I picked up a cheap tube tester (a Sencor T136) and started testing tubes in my R390A. All of the ones I've tested so far read questionable or slightly low on the emissions scale. I'm trying to figure out whether this is due to the tester, or the tubes. I can adjust the 'cal' level on the tester to full scale, so at least the tester seems to work. Just what does the transconductance measurement test? How does it bias the tube? Might I have tubes that need to be replaced, or is my tester not very accurate?

Date: Sat, 7 Apr 2001 10:17:15 -0700
From: "Robert Dunn" <robdunn1@earthlink.net>
Subject: [R-390] RE: [ForSale-Swap] FS: Replacement RF Probes for VTVMs

USM-116 is the military equivalent (but not clone) of the HP 410B electronic voltmeter. This probe uses the same vacuum tube UHF diode in the probe as the HP's so for anyone needing this diode it is a good deal. The probes are good to about 700 MHz but of course the need the 5v or 6v filament supply The probe is not exactly the same, but at least it can be carefully (very carefully) disassembled for cable replacement and the differences between it and the HP probe are small enought that I adapted mine for use with a HP 410C when the probe I got with it in a recent buy turned out to be bad. The HP probes can't be fully disassembled, for example you can't replace the coax if the center

conductor breaks at the probe end. I have a couple or the USM-116 (a and b I think) that I don't use anymore as I have gotten an HP 410B and 410C online now for boatanchor work. The USM-116's came with a spare probe which is how I got the one to adapt to my 410C.

Date: Wed, 18 Apr 2001 09:30:05 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: [R-390] HP410B question

Is the HP410B an RMS-reading meter? When placed in parallel with my Fluke RMS-reading meter, the two meters don't show the same value. I think the Fluke is correct as I was seeing approximately 10V p-p on the scope and the Fluke was showing around 3.8V, but the HP was showing only about 2.8V. Is the HP just out of calibration?

Date: Wed, 18 Apr 2001 11:24:51 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] HP410B question

An audio sinewave. Not sure of the frequency, but I think it's 600cps.

Date: Wed, 18 Apr 2001 11:37:20 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] HP410B question

That's what I had done. The signal in question was an audio sine wave (looked to be a good sine wave on the scope). The two meters did not read the same value. I suspect the HP is out of calibration, but wasn't sure since I'm not positive the Fluke is dead on it either, but it agreed with the scope (0.707 * p-p / 2) and HP was reading a bit less.

Date: Wed, 18 Apr 2001 12:48:04 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] HP410B question

The 410 uses a half wave diode in the probe, so is average reading, with RMS meter markings. On a low disortion sine wave, if properly calibrated, it should read the correct RMS value.

Date: Wed, 20 Jun 2001 21:22:34 -0400
From: Bob Camp <bob@cq.nu>
Subject: Re: [R-390] Thanks and Restoration Update

You might consider some of the HP or GR RF generators from the same era. The HP 606 seems to sell for less than the AN/URM-25(*). As far as I can tell

there is nothing special about a URM-25 that makes it any better for setting up an R-390 than any other signal generator. I know it's totally out of touch to say this, but I used to set them up using the calibrator and off the air signals. You can get things close enough with the calibrator to be able to hear things. You can then use the local or not so local AM stations to do most of the IF stuff. The RF at least through 16 MHz can be set up on thermal / antenna noise if you are patient. The result isn't anything to write home about, but it will get the radio on the air.

Date: Wed, 20 Jun 2001 21:40:12 -0400
From: Kim Mackey <mackeyka@mac.com>
Subject: Re: [R-390] Thanks and Restoration Update

It's nice to know that there are other options for rf signal generators. One thing that concerns me about looking at others is how well they will match up to the R-390A and will they have the right types of connectors. I'd like to be able to get one inexpensive enough that I could afford a nice freq counter as well so I could set the frequency precisely. (Please no comments from the peanut gallery about how only someone rich enough to afford the best equipment should be allowed to own a R-390A).

Date: Wed, 20 Jun 2001 22:04:50 EDT
From: DJED1@aol.com
Subject: Re: [R-390] Thanks and Restoration Update

Really not too necessary to have very accurate frequency for alignment purposes. The internal calibrator can be used to check the received frequency, then tune the URM25 to match. The only time you need a counter is if you're going to mess around with calibrating the PTO- and you can set the end points with only the calibrator. I really got the URM25 so I could measure the sensitivity of the radio. Works for me but YMMV.

Date: Wed, 20 Jun 2001 20:42:41 -0700
From: Ed Zeranski <ezeran@concentric.net>
Subject: Re: [R-390] Thanks and Restoration Update

I'm jumping in here kind of down the line but.. I have a URM-25F bought at a swapmeet then fixed (modulation BS) and used them in the Navy back in the '60s. Also have have a swapmeet '606. The 25 is a very workable box but the attenuator etc is nowhere near the HP-606. Friend and retired co-worker Doug WA6VOV swears by the General radio units and I'm still kicking myself for

missing one. The 25 is OK for working on old BA sets, zero beat on the set is dead nuts accurate, but that $40 606 is more dependable long term.

Date: Thu, 21 Jun 2001 02:02:24 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Thanks and Restoration Update

Hi Kim and group, No need to be ashamed of using low budget test equipment for R-390* alignment-- especially if one is strapped for dough or has other priorities like feeding a family. My first signal generator was an Eico 324 with manual picked up for next to nothing at a flea market. It had the usual Amphenol microphone connector which I replaced with a BNC as soon as I got it home and recapped it to be on the safe side. Since you have to zero beat the SG to the R-390* during most of the alignment procedure instead of the other way around, an accurate SG freq readout isn't a big issue. Getting the IF deck's frequency right involves tuning a radio to 455 MHz and zero beating the SG freq to it before injecting its output into the R-390*, then retuning similarly for the two variants, 467 and 443 MHz for stagger tuning. You can do a decent job aligning the R-390* with a basic unit like the Eico 324. It's reasonably stable after warmup. Diode load is easily read from an analog meter-- also cheap and basic. I sold the Eico later on and put the proceeds toward a URM-25D from Fair and love it. The accessories that come with it are helpful and convenient. I fitted a slightly larger frequncy knob in the same style as the orginal with the added feature of a crank handle. I can whip that thing to its next frequency very quickly. I next located an HP 5328A counter; not a vital piece of gear, but I couldn't resist the urge to acquire that toy with its bright red digital display-- and yet another toy: A TS-505D/U caps off the alignment gear roster; it's the coolest VTVM ever made, IMO.

For PTO end correction it's possible to hear its output on another receiver for getting a handle on how far off it is. However, the HP 5328A really shines for this chore, though.

Alignment is fun now when I get an evening free. It's a pleasure to watch the TS-505D/U's readings peak ever higher with each pass through the alignment steps. "Entry level" gear should not prevent one from doing a respectable job. Main thing is to have fun, be patient, learn, and upgrade inexpensively when opportunities arise.

Date: Thu, 21 Jun 2001 09:39:30 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] Thanks and Restoration Update

Just a quick FYI on the TS-505D/U - I agree it is great! Buyers should avoid the earlier TS-505/U, however, as it requires batteries, and the one that I got was

corroded beyond repair. Not really worth fixing, in my opinion. The TS-505D/U, however, I'd consider restoring - it is that nice!

Date: Thu, 21 Jun 2001 08:02:55 -0700
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] Deam old 505

I agree them old 505D's are OK. I have 3 on the bench. The green rubber test lead for ohms dies after time on one of mine I replaced mine with a general black test lead The battery VM from RS are OK, but when I want the truth I switch the 505 on and use it. I can always find the 505 on the bench. Where do we get the probe tips for them these days? You can pick them up with the cover for 20 25 dollars. Ain't nothing inside you can not fix yourself. My big problem is finding a good voltage to use for calibration.

Date: Thu, 21 Jun 2001 12:10:36 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Thanks and Restoration Update

Gee, I wonder if we were looking at the same TS-505/U. It was pretty rough and broader in width which must account for the space needed for batteries. No need to acquire such a unit as later versions run on line current only.

The TS-505B/U is a worthy unit, little different from the TS-505D/U. Each has a schematic inside the case for clarifying differences. The circuit grounding is different and the DC (AC?) probe in one of these versions doesn't require a resistor, if I recall correctly-- minor variations in other words.

I've not seen an "A" or "C" version, if such exist. Don't despair if you come across a "B" while your heart is set on a "D" (the last version) because the "B" is every bit as good as the "D."

Date: Tue, 31 Jul 2001 15:34:57 -0600 (MDT)
From: Richard Loken <richardlo@devax.admin.athabascau.ca>
Subject: Re: [R-390] Unserviceable and Obsolete?

I once bought a Simpson 260 from the Canadian Ministry of Transport (who were in charge of air traffic control throughout the country) which was tagged as "unrepairable". It was indeed unrepairable since nothing was wrong with it and I used it for ten years before giving it to my nephew.

Date: Tue, 31 Jul 2001 20:39:42 -0700
From: Ed Zeranski <ezeran@concentric.net>
Subject: Re: [R-390] Unserviceable and Obsolete?

260! I just got one on Sunday at a non-Ham swapmeet for $5. This one came from a lab in LA and had the batteries remove so no rot.....!) They are still out there and they still work!

Date: Wed, 1 Aug 2001 09:29:45 -0400
From: "AI2Q Alex" <ai2q@adelphia.net>
Subject: [R-390] Obsolete meters? Naw!

In addition to the Simpson 260 that my father bought me in 1952, I also use (and have just refurbished) a 65-year-old Weston Industrial Analyzer Model 785 VOM. It's about 2.5X the size of a 260. Does anyone else in R-390 land use one?

This Weston jobbie comes in a polished hardwood case, and sports a black bakelite front panel that I shine with furniture polish. It uses separate terminals for each range of dc and ac current, and includes a beautifully machined 100-A shunt the likes of which you just don't see anymore (where have all the skilled machinists gone?).

Like my R-390, the inside of this VOM smells just great when you open the metal sub-enclosure. The smell is a mix of varnish and wax and phenolic. Very nostalgic. Reminds me of my early ham radio days in the late 1950s.

BTW: the Weston 785 is my "standard" against which I judge all my DMMs, and against which I calibrate my homebrew metering circuits. Unlike the DMMs that sometimes go bonkers, it shrugs off RF from transmitters under test.

Date: Fri, 31 Aug 2001 12:43:18 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: [R-390] DMM probes load the test points

I had suggested to Peter that he put a one-megohm resistor at the end of his DMM voltage probe to isolate the meter from the circuits he was measuring. He had gotten low readings at most of the test points during alignment attempts.

The un-isolated DMM voltage probe loads the circuits at the test points and you cannot get proper readings.. Most VTVM's contemporary with the R-390 radios had a one-meg resistor in the DC probe. (I assume that the TS-505 has this. The Heath V-7A and RCA Volt-Ohmists do.)

I suggest that all owners of R-390 radios equip themselves with a nice VTVM of proper age and having an easy to read moving needle meter on the front. No one needs to measure the test point or diode load voltages to three decimal places. You do need to watch the nice moving needle as you make adjustments.

Date: Fri, 31 Aug 2001 12:50:41 EDT
From: Llgpt@aol.com
Subject: Re: [R-390] DMM probes load the test points

That's the truth Roy, a TS-505/*, or the TS-352/* all work very nicely in that regard. DMM's are hardly ever used by me anymore with the exception of certain applications.

Date: Mon, 03 Sep 2001 12:34:30 -0700
From: Daren <redbeard@softcom.net>
Subject: [R-390] Opinion on HP 606b sig. gen.?

I went to the Livermore Ca. radio/'puter swapmeet yesterday, and found a drop dead beautiful, HP 606b signal generator. I'm a beginner at all this, and I will basically have to teach myself the "ins 'n outs" of it's use. He was packing up just as I talked to him, and said the price was $200. From what I've found on the web so far, the price is a little bit high, but not out of line, and I think he would deal down a bit. No manual or leads are included. What say the clan?

Also.....picked up 3 VTVM's. w/out leads or manuals. 1 HP 400d, and 2 more HP 400h's. One 400h was last calibrated by the Navy in mid '98. I gave the guy 20 bucks for the 3, as he was closing out his biz and moving on to greener pastures. Once again I'm going to have to teach myself about their use. I figured the best way to learn this stuff is trial by fire. The VTVM's are a done deal, but I wanted to check with "youse guys" before making the final deal on the signal generator. I've got broad shoulders, so if I deserve to get smacked around for stupidity, I can take it. Lemme' know what you think.

PS: A G Tannenbaum seems to have the best deals on the manuals I have to pick up. If there's any better deals to be found, I'd like to hear about them. Thanks for any input.....Daren

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Date: Mon, 03 Sep 2001 15:39:05 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Opinion on HP 606b sig. gen.?

>and found a drop dead beautiful, HP 606b signal generator.

The manuals for the 606A will hold you until you can track down a schematic for the 606B. They are basically the same except that the B has a SS PS and a separate tap for a frequency counter. At any rate, the manuals are a bit too large to attach. Somewhere around 8 megs encoded as an email attachment. Give me FTP access somewhere other than one of the "free" storage places that harvest user information and I'll upload it for you.

> HP 400d, and 2 more HP 400h's.

Check your attachments directory and you'll find scans of three manuals for the HP 400 series.

Date: Mon, 3 Sep 2001 16:08:08 -0700
From: "Bob Tetrault" <rstetrault@home.com>
Subject: RE: [R-390] Opinion on HP 606b sig. gen.?

Buy that sucker. Deal down if you can, but, barring a few rare GenRads, it's the best of the tube styles. Stable, phase-lockable with the HP 8708 Synchronizer, and with the best attenuator (IMHO, which also reads-out n dBm as well as microVolts. Got one, and a URM-25H or J, and preferentially use the HP. I've seen them for 325 from people that think they gave birth to them, or liberated them from Wright-Patterson.

Date: Mon, 3 Sep 2001 20:26:05 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] Opinion on HP 606b sig. gen.?

I've seen several HP606A's recently for less than $100. The "B" version has an added input where DC voltage can fine tune the frequency. Used as a phase lock input from a synchronoyzer or as a sweep or perhaps FM modulation input.

If you are down towards the San Diego area, I have a HP606A for pickup only, certainly not drop dead beautiful for $50. Needs either new tubes or new capacitors in the modulation section, but output attenuator works fine.

Date: Sun, 30 Sep 2001 10:16:08 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R390A tube chart & PUZZLEMENT!

Last night I asked about that sub as this '62 Imperial has a 6CB6 in the 6DC6 socket and Les replied that it was a good sub.

Are there any downsides? I have some NOS 6DC6's here to swap back. But, that's not the "puzzlement".

This radio appears to be in very good cosmetic shape -- wiring looks very good, very clean, etc., but I haven't pulled any modules as yet. HOWEVER ... it is the worst case in maybe 50 receivers and accessories of various types I've found in terms of tube condition on delivery -- I think.

Five out of the seven 5814A's show shorts on position 3 on my TV7-D/U. Two test good. All are RCA except one of the good ones, a GE. Three 6AK6's also

show shorts on the same switch position. NOS 6AK6's test good. Also came up with 3 weak 6C4's.

Doesn't that seem unreasonable, or is this a common failure mode? I did have a similar experience in testing tubes in a '392, which turned out to be shorting at the tube tester socket. The later TV-7's, maybe just the D's and later, have ferrite beads on each lead going to the tube socket terminals. They tend to crowd on the 7 and 9-pin sockets as they back right up against the bare terminals, at least in this one. Also, the 7-pin socket in particular tends to get loose and move around. I secured all that last time, and I'm getting short-free readings on new and other old tubes.

Could something be so wrong in this rx to damage the tubes? Or is it more likely that somehow my TV7-D/U be overly sensitive on one position? Shorts show only on switch position #3.

While I'm waiting for some advice, I'll go ahead and test the plugins and pull the audio and IF modules.

Date: Sun, 30 Sep 2001 11:57:43 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] R390A tube chart & PUZZLEMENT!

I had a similar issue with my TV-7D. Seems the shorts test adds wear to its selector switch. If you pull your tester out of the cabinet, you may find, as I did, some powdery stuff on the ceramic wafers that must be contributing to overly sensitive shorts readings. I used compressed air to blow the stuff out of said switch and applied DeOxit to the contacts while avoiding getting any of it on the ceramic wafers-- pretty tough to do among those layers and layers. Tester now works fine and switch turns more smoothly.

Date: Sun, 30 Sep 2001 12:12:49 -0400
From: Bob Camp <bob@cq.nu>
Subject: Re: [R-390] R390A tube chart & PUZZLEMENT!

The downside of the 6CB6 is that it does not quite match the gain and AGC characteristics of the 6DC6. As with all subs the capacitance will be different and if you swap tubes you will need to re-align the radio.

The shorts are a bit of a puzzle. I would bet on the TV-7 rather than on a whole bunch of tubes going bad, but it would only be a bet. It is possible that the radio got dropped in shipping or something like that. If so you could have a significant number of tubes messed up. Do you have any idea if the radio worked before you checked the tubes ? If it worked then they are not shorted .....

I am not to surprised about the weak 6C4's. They seem to go soft but the radio still works. I suspect that they didn't get checked to often in normal service. I replace them but often the radio works the same before and after the swap.

I think I'd spend some time getting the TV-7 to the point you trust it. The other option of course would be to eBay it and get another one.

Date: Sun, 30 Sep 2001 12:47:15 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R390A tube chart & PUZZLEMENT!

I suspect it's the TV-7 also, but what's confusing is that not all tubes of a type show that short. The lamp glows bright and strong on some 5814A's for example, and not on others at all -- not even a flicker.

That said, I had posted about this same TV7-D/U some months back. In addition to the problem at the tube socket contacts, I also found that the shorts switch contacts were covered not with powdery stuff, but black greasy stuff. I've seen this stuff elsewhere, and I think it's a type of switch lubricant they used at some time to prevent wear and intermittents.

I cleaned it out with denatured alcohol -- as much as I could, but at the same time wasn't sure. Essentially replaced it with Deoxit, also trying to keep it off the ceramic. It's very difficult to get at those contacts, so some remaining grease may have worked its way out. Now, I say I wasn't sure about the whole thing as I've found the same or similar grease on other switches in other equipment, including contact pins in one or two Cardamatics. It looked like it was supposed to be there. Still, not all the tubes show shorts -- is it a matter of degrees? or rather ohms?

Date: Sun, 30 Sep 2001 21:44:17 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R390A tube chart & PUZZLEMENT!

> If you take a "shorted" tube and test it a couple of times does it always
> come up shorted ? I'm wondering if the switch is intermittent.

Yes -- I worked the switch back and forth and also retested both good and "bad" tubes -- same result. I also allowed the TV7 to cool down for about an hour before I retested-- no difference.
>
> The test is like a leakage test so some number of ohms should trigger it.
> However I don't think it's a very high number. I would expect to have
> trouble on other test first if the problem was leakage of some sort.

The idea is to do the shorts test before quality. The possibility exists that quality testing a shorted tube will damage the tube tester. At least most tube tester instructions say not to proceed to the quality test if the tube shows shorts. If the short is an "inside job", i.e, fault of the tester, then it may or may not be the equivalent of having a shorted tube in there as far as risk of damage is concerned. Can anybody shed more light on this? Still possible that, as Bob says, it's a matter of ohms, so some dirt on the switch or maybe ferrite beads too close together is causing an interaction with some tubes. Otherwise I have a bad run of tubes, I guess. I have other tube testers. I'll have to dig one out for another opinion.

Date: Mon, 01 Oct 2001 12:29:29 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R390A tube chart & PUZZLEMENT!

> Use socket savers... if you can find them AES may have them A VERY good idea.

Thanks Roy, but this tester already has 'em for the 7-, 9-pin and Octal sockets. Problem is the hold-down, not the pin terminals of the 7-pin socket. It's rather soft and loosens up from plugging and unplugging the tubes. The socket saver fastens to the (bakelite or ceramic) part of the original socket through the center bolt/nut. When you pull out a tube, it puts stress on the original socket and mount. I secured it with some gimmickry. Probably not the problem this time -- besides, the new tubes and some of the old test OK -- no shorts for the same tube type. Maybe leakage on the switch contacts as was suggested.

From: mikobrien@att.net
Date: Sun, 06 Jan 2002 02:15:59 +0000
Subject: [R-390] calibration for simpson 260 6 series

Does anyone have or know the calibration procedure for the Simpson 260 6 series VOM.

From: "Al Parker" <anchor@ec.rr.com>
Date: Sat, 5 Jan 2002 21:30:47 -0500
Subject: [R-390] Re: [BoatAnchors] calibration for simpson 260 6 series

I've got a manual for a 260, series 5, if that'll help. I can scan & send the cupla pgs that cover the calib. procedure after replacement of rectifiers, and the other svc stuff.

+---

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Date: Mon, 4 Mar 2002 13:33:42 -0600
Subject: [R-390] ME26 D/U

Anyone know anything about this VTVM? I bought one recently and it looks like it may be an HP410 in different packaging. The manual I have with doesn't include a schematic, but the revisions that are included picture an HP410 instead of the unit I have. Just wondering...

Subject: Re: [R-390] ME26 D/U
From: Richard.McClung@Dielectric.spx.com
Date: Mon, 4 Mar 2002 11:41:00 -0800

<snip> You got it. Electrically it's an HP410. The early models were exact HP's. But you know how the military is. They got to make it bullet proof.....

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] ME26 D/U
Date: Mon, 4 Mar 2002 13:54:25 -0600

That's what I figured. I don't like the packaging on the ME26 as well as the HP410, but this one is is great shape. Looks like it was hardly (perhaps never?) used. In original box no less. "Hey look. Here's an off-the-shelf unit that will work just fine!" "Nah. Use the design, but get it from the lowest bidder." Time to hook it up to the VARIAC and hope the caps are still okay. At least this one has a complete set of probes.

Date: Fri, 08 Mar 2002 09:48:59 -0700
From: Jordan Arndt <jordana@nucleus.com>
Subject: [R-390] TS-505C/U Manual..?

Is there an online source for a TS-505 C/U VTVM..? Does anyone have a pic of the RF Adapter..? I think this is the same VTMV that is listed as Required Equipment for the 390/390A service bench... What is the input impedance/resisitance...??? 73 de Jordan...

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
To: "R390 (E-mail)" <R-390@mailman.qth.net>
Date: Fri, 8 Mar 2002 11:03:52 -0600
Subject: [R-390] Need Meter Repair Help

I recently acquired an ME-26D/U VTVM. It is in excellent shape except the meter movement itself. The pointer drags against the dial plate ever so slightly near the zero-volts end. I took the meter out expecting to be able to open it and adjust the needle, but when I got it out of the box, I found that job to be a little more complicated than I first thought. This meter has a ring that locks the back

cover of the meter to the bezel/outer face plate. This is held together with a locking ring. The ring has four small slots that I assume provide the means for a special tool to unlock the ring by twisting it about 10 degrees. The problem is I don't have a tool to unlock the ring. The shell is approximately 3.7" and the ID of the slots is about 3.8" making the tool that would be used to unlock this ring pretty special. Does anyone have experience with this type of meter? Any chance of anyone having such a tool to unlock the ring? Can it be done with a small punch and a hammer without hurting the meter? I hesitate to try this, but it might my only resort. Any suggestions on a makeshift tool to unlock it? Any meter-rebuilding experts out there?

Date: Fri, 08 Mar 2002 13:39:57 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Need Meter Repair Help

Fix into a block of wood brads or screws with the heads clipped off to fit the meter mounting holes. Sit the meter over the nails/screws and tap the ring with a screwdriver and a hammer.. lightly. Squirt a bit of Windex into the area to lubricate the thing.

If it's stuck, push down at many places on the ring from straight above with a screwdriver to loosen it. There is a rubber gasket to allow a tiny bit of play. Once it starts it will go more easily.

If that fails, take the thing to the home store and search for some copper pipe the right size to make a wrench. Pipe a bit bigger can be bent in to fit. Ensure equal pressure from each of the four fingers by careful filing.

Date: Fri, 8 Mar 2002 16:49:26 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Re: TS-505C/U Manual..?

This manual is on the R-390Y2K manual disk, at least I sent it to Jeff and some one else, too. Its out there somewhere! If not I have a copy of the manual. I think I remember sending it to Ken Grimm of BAMA fame.

Date: Fri, 08 Mar 2002 18:09:20 -0700
From: Jordan <jordana@nucleus.com>
Subject: Re: [R-390] Re: TS-505C/U Manual..?

The Link is: http://www.logsa.army.mil/etms/find_etm.cfm

Type in TS-505 in the bottom dialogue box.... 73 de Jordan...P.S. Please be prepared to wait awhile as I'm sure the site will be flooded with requests as this gets out....

Date: Sat, 09 Mar 2002 22:46:50 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Re: TS-505C/U Manual..?

> > http://www.logsa.army.mil/etms/find_etm.cfm

You will get three hits.. one is the spares parts list. one is for the 505 model.. one is for the 505, 505 A ... and through the 505D model. The 505 has a battery compartment on the front and three binding posts. All the others have NO battery and one binding post (ground) My 505D is warming the corner of the dining room just now.. I was reminded of how nice a meter it is and dug it out for a little excercise.

Date: Sat, 09 Mar 2002 19:47:26 -0800
From: eengineer@erols.com
Subject: Re: [R-390] Re: TS-505C/U Manual..?

Yes , It is on the ADDENDUM CD.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
To: "R390 (E-mail)" <R-390@mailman.qth.net>
Date: Mon, 11 Mar 2002 16:03:52 -0600
Subject: [R-390] ME-26 Meter problem update

Well, I got the meter movement fixed in the ME-26D/U. Without a welder, milling machine, etc., I decided to try with the available tools. I mounted to the meter upside-down to a piece of wood with some neoprene washers to protect the finish. Using two large screwdrivers, I was able to apply pressure to two opposing slots and push the ring around to its unlocking position.

After fixing the movement (straightening one of the bends such that the needle moved about 0.020" away from the meter face), I started putting it back together. Simple -- just push the locking ring back into position with the two large screwdrivers. Was working great until one screwdriver slipped causing me to loose my hold on both screwdrivers. The problem is both hands were applying pressure towards the meter back. When my knuckles came into contact with the lugs, I managed to skin my knuckles quite nicely. Pain ensued (as well as some conversation with the meter which I'm sure it didn't understand but it helped me feel better anyway).

I resorted to tapping the ring back into place with a hammer and large screwdriver (I know! -- a screwdriver isn't a punch, but I don't have a nice assortment of punches). At any rate, it tapped back into place rather easily with no more lost flesh on my part and no damage to the meter. I put it back together and it is working smooth as ever

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Subject: Re: [R-390] Need Meter Repair Help
From: "Roger L Ruszkowski" <rlruszkowski@raytheon.com>
Date: Fri, 8 Mar 2002 09:47:37 -0800

Yes, there are spanner tools to do it. ...a 1 x 2 pin stake. Drill two holes in the stake with 4 penny nails at the correct span to fit the ring. Grind end of 4 penny nails to fit the slots in the ring.

OR

You can put a pin punch against one of the slots and tap the ring loose. You will want to grip the meter in a big bench vise if you can. Just a challenge in tools. Tim Allen never addresses these real life problems.

From: N4ue@aol.com
Date: Sun, 7 Jul 2002 16:27:42 EDT
Subject: [R-390] (no subject)

Dallas, this is excellent information on the R-390! I can't wait until my new home is done, so I can 'git back at it'. One question for the group: I just acquired a nice HP 410C, but natch the RF probe was missing. Any good information on how to construct / purchase a replacement? All my handbooks (and radios) are in storage awaiting the move.

Date: Sun, 07 Jul 2002 19:24:13 -0700
From: "Dennis L. Wade" <dlwade@pacbell.net>
Subject: Re: [R-390] (no subject)

Ron's question brings up one for me. Could someone summarize the differences between the B (what I have) and the C models of the HP 410? Do I need to start shopping for a "C" model now? :)

Date: Mon, 08 Jul 2002 07:26:34 -0400
From: JAMES T BRANNIGAN <jbrannig@optonline.net>
Subject: Re: [R-390] (no subject)

The "C" is a transistorized version of the "B" Physically, they are completely different. The RF probe is a plug in, otherwise I believe the specs. are the same.

I had two "B"'s, they and their probes died. I found a "C" at Fair Radio a few years ago. It is a "nice to have" piece. I use it to align transmitters.

Date: Sun, 4 Aug 2002 12:40:41 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] HP400e

> Anyone familiar with this piece of gear and how it copares with a 410(x) series Tnx

Entirely different animals - the 400 series are AC only voltmeters, for measuring AC signals from 1 millivolt to 300 volts FS (full scale), from low freqs up to about 10 MHz. The 410 series is more closely related to the classic VTVM's (vacuum tube voltmeter) from RCA, Heath, EICO, etc. It measures DC voltage and current, AC volts, and resistance. AC voltage is measured with a large probe, with sensitivity of 0.5V FS to 300V FS. 2% accuracy from 100 Hz to 50 MHz, 4% from 50 to 100 MHz and 1.5 db from 100 to 700 MHz. [from the 410C manual]. There's also a useful AC probe adapter that converts it from a 1/2" spike tip to a shielded pair of "N" connectors for placing in a transmission line. So to measure audio signals, get a 400. To measure transmitter output voltage (and calculate power into a dummy load), get a 410.

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] Tube testers and other babblings
Date: Sun, 18 Aug 2002 08:54:51 -0400

Your B&K tester is a good middle quality mutual conductance tester that should serve you well. <snip>

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Date: Thu, 29 Aug 2002 08:54:01 -0500
Subject: [R-390] Audio Signal Generator question

An HP200CD followed me home from the local hamfest recently. I figured it was worth $15 since it was working (plus it matches my HP410B). It is a 200CD model. Last night someone was advertising a 200AB on Ebay (a very nice-looking one at that). Is the CD a later version of the AB? Is that only difference? Anyone?

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Audio Signal Generator question
Date: Thu, 29 Aug 2002 10:41:39 -0500

Great...NOW you tell me it has expensive output tubes...sigh. <g>

> No. The C version uses a different pair of output tubes.. and

> they are odd and expensive I think. Check this with someone who knows for
> sure. Roy

From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] Audio Signal Generator question
Date: Thu, 29 Aug 2002 13:34:03 -0400

The "CD" has a balanced, 600 ohm output. The "A" does not. VERY late versions of the "CD" were also very low distortion. This series of HP generators was manufactured for decades, and were very stable and reliable. Suggest that you obtain the correct service / owners manual. Make sure that the manual that you get matches the serial number of your unit, as there were many mods made over the production lifetime of these units. Chuck N1LNH

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Date: Thu, 29 Aug 2002 13:42:44 -0500
Subject: [R-390] Printing DjVu files (was: Audio Signal Generator question)

Does anyone know of a problem printing DjVu files? I downloaded the HP200AB manual from BAMA, but it is in DjVu format. I downloaded the viewer and I can see it just fine, but if I "Print Preview" or "Print", I get a blank page. Is there a setup I missed?

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Printing DjVu files (was: Audio Signal Generator question)
Date: Thu, 29 Aug 2002 16:24:47 -0500

Well, if all else fails I SHOULD HAVE READ THE DOCUMENTATION. I found that one isn't supposed to use the File->Print facility from the browser. Instead, one must use the print icon on the DjVu toolbar. It works now. Thanks to all who replied.

From: "Glen Galati" <eldim@worldnet.att.net>
Subject: Re: [R-390] Audio Signal Generator question
Date: Thu, 29 Aug 2002 12:20:39 -0700

Hello Barry & Crew, Nice Find on the HP-200CD. The 200AB is a lower frequency version (20 Hz to 40KHz) vs 200CD (5 Hz to 600 KHz). This line of Audio Oscillators is one of the best and most popular ever manufactured by H-P. Both are Vacuum Tube types with this version in production more years than one can imagine. It was in my 1963 HP Catalog at a cost of $195 vs $165 for the 200AB. Output level on the 200 CD is 10 Volts into 600 Ohm Load. The 200 CD is very nice for doing IF alignment and tests and of course for all your audio work.

From: "Bill Hawkins" <bill@iaxs.net>
Subject: RE: [R-390] Audio Signal Generator question
Date: Thu, 29 Aug 2002 21:37:51 -0500

Well, things are slow here, so I dug out the HP manuals for the AB and CB. The earliest is a 400B, tubes 6J7, 6F6, 6F5, 6V6 and 5Y3, Wein bridge with lamp bulb regulator, 400 VDC, not available in 1960. The AB has 6SJ7, 6K6, 6SN7, (2) 6K6 PP and a 5Y3, 250 VDC. Rated 1 watt into 600 ohms (25 VRMS), range 20 to 40,000 CPS, 1 % distortion 30 to 20K. Cabinet and rack mounting, good for measuring speaker impedance without an additional amplifier, price $120 in 1960. The CD has a balanced Wein bridge and amplifier, tubes 2 6SH7, 2 6AU5 and a 5AR4, 190 VDC. Range 5 to 600,000 CPS, distortion less than 0.5% below 500 kc, output 160 mW (10 V) into 600 ohms, price $150 in 1960. In short, the AB provides power in the audio range. The CD provides a range wider than audio at less power. HP held the patent for Wein bridge oscillators regulated by lamp bulbs. It provided the best signal. Others had to go with Twin T, etc. I'd snap the AB on EB if I was in a snapping position.

Date: Fri, 30 Aug 2002 18:14:55 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: [R-390] Manual copies: HP 200CD and the older HP 200C

Available: Manual copies for the HP 200CD and the older HP 200C signal generators I'll be making copies for those who want them next week.

Date: Fri, 30 Aug 2002 23:54:54 +0000
From: Philip B Atchley <ko6bb@juno.com>
Subject: [R-390] Millivac RF Voltmeter help

I have a test instrument here that I'd like to get a little information on. First, let me mention that I have used many Laboratory RF instruments during past "RF careers" but have never run across this particular instrument. I did a web search on it but all I found were a couple units offered for sale with no other information. I suspect it is rather old as it appears to be early solid state and I can hear the "Choppers" whine. It's last inventory sticker is 1994 so I suspect it was pulled out of service around that time.

All I know about it: It is a rack mount Millivac Industries Model MV-828AR RF MilliVoltmeter with "Type G probe". The instrument has full scale ranges of 1mV to 3 Volts full scale in 8 ranges. It should be able to be read down to about 0.2mV or less. One interesting point. The screw on probe tip is missing,

though I believe the probe is electrically complete. But on the 1mV range the instrument is very sensitive, even shining a FLASHLIGHT or other light on the end of the probe affects the meter ZERO (Discovered when I turned the bench light on).

QUESTIONS:
Anybody know the frequency range, input impedance etc of this unit? Can this unit be used IN PLACE OF the HP Voltmeter/RF probe in the alignment of R-390A's etc?

From: "Bob Camp" <ham@cq.nu>
Subject: Re: [R-390] Millivac RF Voltmeter help
Date: Fri, 30 Aug 2002 20:35:22 -0400

Later on these guys got bought out by Boonton. The Boonton RF millivolt meters are direct descendants of the unit you have. The circuits in all of them are fairly similar. I do not have data on the exact unit you have but here's my guess:

Frequency range to 1 GHz
Input impedance > 5 K ohms , less than a pf or so

The screw on tips should be easy to find since I have only seen one type. The hard part is getting a unit with the probe still on it. They matched the probes to the instruments so a late model probe probably will not work right with an early model instrument. The light sensitivity is due to your hitting one of the two diodes in the head with light. They do a difference measurement between the two to cancel out the temperature coefficient of the diode. The chopper in the box switches between the two diodes (more or less). Sounds like yours is in working condition. I'd hang on to it. They are not as forgiving of high voltage AC as some devices but they are great for low level signals.

From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] Manual copies: HP 200CD and the older HP 200C
Date: Sat, 31 Aug 2002 03:52:38 -0400

HP manuals are serial number specific. Please look at the first page for the numbers included, and post them. Newer manuals contain back-dating information for older manuals, but only up to a point.

Date: Tue, 10 Sep 2002 20:42:37 -0700
From: Walter Salmaniw <salmaniw@shaw.ca>
Subject: [R-390] Re: Capacitor Checkers

Fellas, I attended my local hamfest last weekend and picked up a couple of capacitor checkers, to be used during my R390A rebuild. I'm almost embarrassed to say that I paid $2.00 for one and $0.50 for the other.

The first is the Eico 950B, while the other is unknown to me. It's the Cornell-Dubilier BF-90 Handicheck. Does anyone have any experience with this one. How useful is it in repairing boatanchors? This one says that capacitors may be checked while in circuit, but disconnect from the powerline before attempting to do this. Comments? By the way, I found on-line a manual for the Eico, but nothing about the BF-90.

Date: Tue, 10 Sep 2002 22:42:23 -0700 (PDT)
From: Rodney Bunt <rodney_bunt@yahoo.com>
Subject: [R-390] Capacitor Checkers - useage

The in circuit tester uses the same principle as the Heath C-1 tester. For checking "shorts" they try and get 60Hz signal (from the mains transformar) to travel through the capacitor, for small caps this won't happen so there will be no indication, for a short, there will be a big signal passing through. Then the other test, is the "open circuit test".

For this test a "high frequency signal" is impressed across the capacitor, if the cap. is open circuit there will be no signal passing through, if it is "ok" then the high frequency signal will pass normaly, and give an apropriate indication. A fuzzy edge indication on the display shows leakage, or intermittent behaviour.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
To: "R390 (E-mail)" <R-390@mailman.qth.net>
Date: Mon, 16 Sep 2002 13:47:37 -0500
Subject: [R-390] Replacement caps for HP200CD

The HP200CD I have has two "Black Cat" caps I'm going to replace. They are 0.5ufd @ 400VDC. I know the standard today is 0.47ufd, but would I be better off sticking to the original value by using two 1ufd in series?

If I do, is it acceptable to use 200VDC caps? Is there any adverse effect from doing this? I know that caps in parallel add to the total capacitance, but each cap in this case will tend to act independently at different frequencies. I don't think this is the case with series caps, but I'm not sure.

From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] Replacement caps for HP200CD
Date: Mon, 16 Sep 2002 15:41:26 -0400

Just replace them with 0.47 / 400V units and be done with it. Given the ACTUAL capacitance of the two types (new Vs old), as well as the standard tolerance

for these types of capacitors, which is 20%, the chances of either being exactly as marked is practically nil. Also, there are no circuits in the 200-CD that are that critical as to cap. values. Leakage, as is probable in the old "black" units, is the real culprit that you need to address. Chuck N1LNH

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Replacement caps for HP200CD
Date: Mon, 16 Sep 2002 14:49:51 -0500

Actually, the caps in there right now were 10%. That's what got me to thinking that I might need to stick as close to 0.5ufd if possible. 0.47 is already at 6%. I agree that this circuit shouldn't be all that critical, but I just didn't know if I should worry about it or not. Sadly, the only local place that has parts like this only had one 0.47 @400V with leads.

They had some that were PC mounted, but I didn't want to try to tack leads on them. If I could get the board off, though, I could easily mount these to one hole and drill another hole with a jumper. Hmmm, that might not be all that bad an idea.

Date: Mon, 14 Oct 2002 13:35:33 -0400
From: Michael Crestohl <mc@sover.net>
Subject: [R-390] FS: Hewlett Packard HP-410-C VTVM

Hi Gang: I have an extra HP 410-C VTVM which is the lab-grade VTVM that Collins used on the line and in the engineering department when the S-Line was produced. It is one of the recommended pieces of test equipment in the service manuals.

Unfortunately I do not have the AC/RF probe and have priced the meter accordingly at $75.00 plus shipping. Any interest from the group before I post it you-know-were??

From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] FS: Hewlett Packard HP-410-C VTVM
Date: Mon, 14 Oct 2002 15:14:41 -0400

The AC / RF probes for these models were matched to the particular unit during manufacture. Once the probe is lost, it is not possible to plug in just any random probe and have the meter function properly. Over the years, I have seen many 410-Cs for sale without probes, but have Never seen a separate probe for sale anywhere. Wonder where they go?

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] FS: Hewlett Packard HP-410-C VTVM
Date: Mon, 14 Oct 2002 14:13:09 -0500

Is the probe for the 410-C different from the probe for the 410-B? Does the same "this is the correct probe for this meter" rule apply for the 410-B? I didn't think so, but I might be wrong.

Date: Mon, 14 Oct 2002 22:07:59 +0200
From: Heinz und Hannelore Breuer <hbreuer@debitel.net>
Subject: Re: [R-390] FS: Hewlett Packard HP-410-C VTVM

No Chuck you mixed it up, this is true for the Boonton RF-Millivoltmeters Model 92 or something but does not apply to the HP-410B and HP-410C. Also check the manual, there is nothing written about not to change the probe. You have to adjust a pot inside the meter to set the filament voltage but that's all you need to do. The voltage is either 5V or 6.3V depending on the tube (2-01C or EA53) used in the probe. I have acquired a separate probe on eBay (much cheaper than a 2-01C from AES) for the HP-410B which was still sealed in the military packing and it works exactly as the original probe. The probe for the HP-410B is wired to a terminal block underneath the instrument. The probe for the HP-410C has a standard 1/4" plug. The schematic for both probes looks identical. Check eBay for probes or a broken HP-410B/HP-410C with probe. I have seen both going quite cheap.

From: "Rob Dunn" <robdunn1@earthlink.net>
Subject: Re: [R-390] FS: Hewlett Packard HP-410-C VTVM
Date: Mon, 14 Oct 2002 14:10:19 -0700

I don't believe this is true, I do know that the 410C could be purchased with or without the AC probe and the AC probe could be purchased separately as well. I can believe that the calibration is only valid for a specific probe paired with a specific meter to account for variations in the vacuum tube UHF diode characteristics but the 410C is very easy to recalibrate and the procedures are in the manual. I have a 410C and it developed a defect in the AC probe that was non-repairable (assemblies are potted). I was able to successfully adapt a replacement probe for a ME-126 VTVM (I think that was the number, it is a Military knock-off of the HP 410B) to be used as a replacement. Later I bought a brand new HP 410C AC Probe off of Ebay. Put the new probe/meter combination through a calibration and it measures accurately and reliably. Great meter. I also have a HP 410B that I rebuilt and calibrated and a couple of the ME-126's. Too many meters for a small bench. Need to clean out some.

From: "Glen Galati" <eldim@worldnet.att.net>
Subject: Re: [R-390] FS: Hewlett Packard HP-410-C VTVM
Date: Mon, 14 Oct 2002 17:04:05 -0700

You are correct on the 410C VTVM. The AC Probe was a seperate option when we requisitioned ours in the Air Force back in the 70's. There may have been another NSN that included the probe as a Option for the government. The units that we received were without the AC Probe and we had to requisition separately. I believe that you were referring to the ME-26 Series of VTVM's that the U.S. ARMY used extensively. This was a predecessor to the HP 410 Series Multimeter and was very rugged in a squared off rectangular aluminum case. The AC Probe was hard-wired along with the rest of the test leads. This probe was much larger in diameter. The 1970 HP Catalog listed the 410C with or without the AC Probe PN: 11036A. The Meter and probe together cost $495 back in 1970, or the probe alone was $70. Now for a little TRIVIA. Did you know that Collins Radio assigned a Part Number to this VTVM? The HP 410C also has a Military Designation of ME303A/U. According to the FEDLOG Dated 1 Sept 98 the governments last shown procurement was $532.00. NOW FOR THE REST OF THE STORY! The HP-410C Probe 11036A is also known as a MX-8881/U and was last procured for $364.78 a piece. All branches of the armed services used or still use this probe. It is also part of some specialized Test Set such as the AN/TYA-23 and 27 and shows usage on a wide range of weapon systems from the Poseidon Submarine to the USAF F-111 aircraft. The HP AC Probe 11036A is usable to 300 VAC, 20 Hz to 700 MHz, Accuracy +/- 3%. GOOD DAY.....

Date: Wed, 16 Oct 2002 19:47:09 -0400
From: rbethman@comcast.net
Subject: Re: [R-390] TS-505 and TS-352?

The TS-352 is NOT a VTVM. It is all solid state.
The TS-505 series IS a VTVM.

Date: Thu, 17 Oct 2002 12:39:25 -0400
From: rbethman@comcast.net
Subject: Re: [R-390] TS-505 and TS-352?

The biggest point is that the TS-352 IS NOT a VTVM, and does NOT have the same high input impedance. Therefore, it WILL NOT do the same job as a VTVM I can't find the PDF, but someone posted a link to manuals awhile back. There was one there.

Subject: Re: [R-390] TS-505 and TS-352?
From: Richard.McClung@Dielectric.spx.com
Date: Thu, 17 Oct 2002 10:01:44 -0700

The TS-505D/U TM is on a CD that one of the list members has produced.
<http://users.erols.com/eengineer/add.html>

Date: Thu, 17 Oct 2002 13:15:15 -0400
From: rbethman@comcast.net
Subject: [R-390] TS-505 manuals!

For those wanting the operator's manual, and the maintenance manual, I have them both in PDF form. Zipped together they make 711KB. Send request to me direct and I'll send them by E-mail.

Date: Mon, 25 Nov 2002 09:21:36 -0800
From: Dan Merz <djmerz@3-cities.com>
Subject: [R-390] xtal wave spikes

Hi, in looking at the output from the front end high freq. oscillator (40 to 60 Mhz xtals) on the Mackay 3010, I noted double peaks on some of the waveforms, though the nominal frequency was ok. My first reaction was that this could be symptomatic of a failing crystal though the output works ok and the right signals are received in the radio on the band in use. The spike occurs on the downside of the wave, kind of a minor glitch as the wave is decreasing. Does anyone know what this means or what is causing it? Most of the xtals don't exhibit this characteristic, but a couple are dead. I'm going to replace the dead ones - MH Electronics says they will provide replacements for $15 ea if I'll send them a good crystal as example of spec's. Is this a reasonable price compared to other possible providers? thanks, Dan.

From: "Bob Tetrault" <r.tetrault@attbi.com>
Subject: RE: [R-390] xtal wave spikes
Date: Mon, 25 Nov 2002 10:01:46 -0800

Dan, The presence of irregularities in a waveform is not immediate evidence of a failing crystal. Either they don't work or they begin to lose output and ultimately don't work. Unless the oscillator is tuned, at the output, for the crystal frequency, and unless the oscillator is biased explicitly for that particular crystal and mode of operation, there is very great likelihood that some harmonic energy is being generated by the oscillator. Also, some oscillator circuits are better at harmonic generation than others. You would need a spectrum analyzer or a VHF/UHF receiver to investigate this, and the fact that some of your crystals do not exhibit the spike on a scope doesn't mean that significant energy isn't being produced at *their* harmonics. The fact that this energy is being injected into a mixer mitigates the presence of any harmonics, as the mixer itself is a harmonic generator. They are sometimes referred to as a comb generator in the older literature. In other words, don't worry. Is there sufficient amplitude? Is it grossly distorted? This begins to get off-topic, but there is ample and long standing evidence that a square wave with very fast edges is the best waveform to drive a mixer. Such a waveform has quite high energy in the harmonics. It is the relatively slow transition in the interval between either fully saturated ON or

fully cut OFF that promotes susceptibility to intermod. Thus a fast square wave minimizes the susceptible time.

Date: Mon, 25 Nov 2002 13:16:51 -0800
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] xtal wave spikes

Bob, the wave amplitude ranges from about 1 to 1.7 volts pp output from the cathode follower that feeds to the single-balanced diode ring detector, with a couple of the xtals producing 0.8 volts pp. I don't think there is gross distortion other than what I described but I'm just looking at it with a scope. I'll order the dead crystals after trying a couple of different tubes in the oscillator but I don't expect a miracle at this point with tube substitution.

Your comments about the square wave brought back some faint memories of fourier series representation of square waves but my memory bank need refreshing about that and what a mixer really does besides adding and subtracting the frequencies of waves put into it. I do remember that a square wave is generously endowed with waves of many frequencies, and hence its utility in testing. thanks for the comments,

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From: "Bob Tetrault" <r.tetrault@attbi.com>
Subject: RE: [R-390] xtal wave spikes
Date: Tue, 26 Nov 2002 08:48:40 -0800

Dan, The more amplitude the better, subject to the limitations of maximum diode current at the higher amplitudes. It does concern me that your minimal amplitude approaches the turn-on voltage of a silicon diode; those bands will be more likely to perform poorly in the presence of strong signals, as well as suffering from increased conversion loss. OTOH, if it means that you'll have to replace all the crystals and find a hot tube and re-bias for increased output, etc, etc, one can reach a point of decision...

Date: Tue, 26 Nov 2002 15:34:17 -0800
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] xtal wave spikes

Bob, the diodes in the ring detector are germanium 1N82a's so I think the turn-on voltage is lower if I remember right compared to silicon type. I was down measuring some more and found lower oscill. output voltages than before for some reason and thought maybe I was reading my scope wrong before I checked the 2nd receiver I have to see if I could get what I measured before since I had both of them on the bench when I made the first set of measurements. I got the lower voltages there too so I must have made a slip between my notes and the scale factor, and the highest voltage is around 0.5

volt (not 1.7). And now I don't see the spikes that I saw before !!! The waveforms are now very smooth. I'm at a loss on that. I've been passing one 6BL8 tube between the two sets for the oscill/cathode follower as I'm short on that tube type. It may be
possible that in exchanging tubes I used a different 6BL8 before for the oscillators; the sets have 2 each and at one point I only had 2 to use between the two sets and was exchanging both; now I found another one and have 3 and only exchange one of them. Maybe there's something in one of those 3 tubes that would account for the spikes. And I noticed that for one of the xtals that I thought was bad, I could get a 0.1 volt pp wave or maybe a bit lower at the cathode follower output but on the ring I didn't get the waveform showing up so I interpret that to mean that the output is barely there and not strong enough, near the threshold. But there may be another reason for this behavior, maybe the operation is just erratic for that particular crystal. This'll take a little more snooping on my part. This particular crystal was diagnosed as not working several weeks ago but was working when I checked it later and then was working again today at the particular location mentioned but was not at the other location. By the way, I'm wondering if there is a replacement unit that might be put here in place of the 4 diodes since these were put in back when this type of mixer was just coming into the picture and they might not be as good as later units. I'm also wondering if you would ever find a matched set of 1N82a diodes to replace the originals. Mini-Circuits makes a balanced mixer but I don't know if you could stick one of these in and I don't know what kind of diodes are in these mixers. At this point I have no reason to think I should replace the diodes but am wondering what-if.... One of these receivers works pretty good and is on a par with the 390a as far as detecting weak signals so I have no reason to think the oscillator level is really too low for the good xtals at least. I haven't noticed any problems with strong signals other than bc stations need about 20 db atten on the front end (built in attenuator is there for that) to behave nicely, a known characteristic of this radio. And the other receiver also is comparable but has some other dial repairs and intermittents that I'm trying to remedy Dan.

From: "Bob Tetrault" <r.tetrault@attbi.com>
Subject: RE: [R-390] xtal wave spikes
Date: Tue, 26 Nov 2002 17:34:43 -0800

Dan, The 1N82a's are a similar RF type diode as compared to the 1N34. While the turn-on voltage is lower for a germanium as you pointed out, the oscillator voltages still seem marginal. They can still be found, though I don't know where. I think a suitable newer tech replacement would be the Schottky type, which has a similar turn-on threshold. Matching them would be easier than the old one; they are much more consistent in the processing, and in any case, the matching need only amount to a match of the forward voltage as measured by a DMM in the continuity mode. The Mini-Circuits (MCL) mixers are 50 Ohm devices which might work with a cathode follwer as the LO driver, but not with

the IF output, which I am sure, in your case, is probably very high impedance as most toob circuits were designed for such levels. The MCL diodes are Schottkys. I take it that this is a mod? Or a production design? If it is a production design, it would explain the BC band performance issue. Sure as can be, that is a common band for such phenomena if the receiver is compromised for intermod.

Date: Sun, 05 Jan 2003 10:42:08 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] kilocycle/megacycle movement

The FET vom will do fairly well but if you are going to work on old tube stuff you really need a VTVM. A lot of the readings are affected by the loading the voltmeter puts on the circuit. A ME-26 or it's HP equivalent is a good one to get.

They are dirt cheap. Ebay is a good place to find them. The 465 with DVM option is an interesting gizmo. I have one sitting here. Like all digital volt meters it has it's limitations. A lot of the alignment procedures are "tune for peak" or "tune for null" stuff. That's a real pain with a digital display. The military version of the 465 should have a manual on the same site as the 390 stuff. It's not the same as the one you and I have but it might be a help.

From: "Dave Faria" <Dave_Faria@hotmail.com>
Date: Mon, 3 Feb 2003 12:40:13 -0800
Subject: [R-390] Off Topic Question

Good afternoon list. I need info on a Triplett meter picked up at a hamfest. Is there a person or list where I can ask questions?

Date: Mon, 03 Feb 2003 10:50:59 -0800
From: shadow <shadow@gilroy.com>
Subject: Re: [R-390] Manual / Triplett / Off Topic Question

Dave..... Triplett has a site. Send them a email and include you Smail address...
If the have a manual or print.... They will mail you photo copy. I have had very good luck getting manuals...

Date: Fri, 21 Feb 2003 19:01:28 -0600
From: blw <ba.williams@charter.net>
Subject: [R-390] Hickok 600A manual wanted

Got one tester today, a B&K Dyna Quick 350 with tube data book. I'll get the 600A on Sunday. Does anyone know where to get the manual/tube data?

I tried BAMA already. These were free, so they have a new home here. These testers came about from the free 'wanted' ads that I run most of the time.

I brought home 3 boxes of good tubes, from what I saw. I saw some 6C4 and 6EW6 boxes in there. There is a pickup bed worth of more tubes to get Sunday when it isn't raining so much. Also brought home a Wurlitzer mono amplifier that uses 2 6L6s. I'll get a Rockola amp with matching speaker on Sunday, and more electronic goodies. The guy said that he had a lot of TV and radio repair books to give me too.

From: "Al Parker" <anchor@ec.rr.com>
Subject: Re: [R-390] Hickok 600A manual wanted
Date: Fri, 21 Feb 2003 20:34:32 -0500

Hi Barry, Sounds like a good haul. I've thought about doing those ads, like a few guys do, but the "shopper" here charges pretty hi for them. Here's some stuff from my archives, some is old info & links might not work, but first one is good:

'Padgett's page" http://www2.gdi.net/~padgett/hickok.htm a good one

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http://www.0wned.org/~hstraub/hickok.htm

There are schematics, manuals, and settings for this and other Hickock testers at http://www.0wned.org/~hstraub/hickok.htm
in the TESTER DATA data section. In the ABOUT section there is info to contact Wendell E. Hall who still repairs them.

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try Bill Waters (wate@juno.com), who services Hickoks
and has a ton of replacement parts and tube data.

See: http://www.vacuumtubes.com/
specifiacally: http://www.vacuumtubes.com/manuals.html
He offers the lates Hickock roll chart in book form for $15.

From: "AL MANHAN" <capt.al@verizon.net>
Date: Sun, 23 Mar 2003 11:21:55 -0500
Subject: [R-390] Re: R-390 digest, Vol 1 #622 - 10 msgs

You can find all the original HP manuals at Consolidated Surplus.....
cs@usimperio.com A little pricey but available.

From: tburr@dixie-net.com
Date: Tue, 8 Apr 2003 09:03:10 -0500 (CDT)
Subject: [R-390] Suggested Test Equipment for R-390A Alignment ??

Can anyone suggest/recommend a good basic list of "test" equipment to check the operation of the R-390A. Is the AN/URM-25 absolutely a must - or can anyone recommend a specific substitute type signal generator ? I have two R-390A's in storage that were operational years ago, and want to get them out put them to use ("If my back does not give out on me"). I plan to be asking a lot of "stupid" questions in the future, so please do not be too harsh on me. I am not a tech, but I am sincerely interested in learning about the R-390A.

Date: Tue, 8 Apr 2003 09:11:51 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Suggested Test Equipment for R-390A Alignment ??

ISTR people swearing by (and some swearing at) their HP 8640B. I really think mine is the best non-synthesized RF generator I've used, in almost 40 years of pushing elctrons and making stuff work. My AN/URM-25D is a fine piece of test gear, but the 8640B is IMHO at least one cut above.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Suggested Test Equipment for R-390A Alignment ??
Date: Tue, 8 Apr 2003 09:18:58 -0500

Welcome. While the AN/URM-25 is supposed the instrument of choice, it isn't required. A stable signal source with sufficient attenuation that can be matched to the various test points are all that is needed. The test procedures frequently mention the accessories that are part of the AN/URM-25's list of accessories, but they are not absolutely necessary. I used an AN/TRM-1 to align my first R390A. I've since acquired a nicer GeneralRadio that I prefer and I plan to sell the AN/TRM-1. Some guy had a large inventory of AN/URM-25 generators a while back. Perhaps he still has some. Ask any question(s) you want. The guys on this list stand ready to help!

Date: Tue, 8 Apr 2003 14:52:07 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>

Subject: Re: [R-390] Suggested Test Equipment for R-390A Alignment ??

I like the URM-25 because, to be blunt, I'm not the brightest bulb when it comes to repair of RF requipment, and I like following the exact instructions with the exact equipment called for. But if you can ask questions and understand the answers like "how do I get 1 UV out of my framitz siggen", then you'll do fine with that approach, too. I think there is enough information in the archives to do basic alignment with no siggen, but an analog meter does help - the VOM I've got is too sensitive sometimes for alignment purposes. I use a TS-505 or a Simpson 260.

Date: Tue, 08 Apr 2003 17:45:33 -0400
From: "Gregory W. Moore" <gwmoore@moorefelines.com>
Subject: Re: [R-390] Suggested Test Equipment for R-390A Alignment ??

Call me old-fashioned if you will, but I can't recommend anything better than the AN/URM-25. I own a 1960's vintage RCA WR-50B sig generator, and a General Instrument 1310?? (the nomenclature number is partially obliterated on the front panel) Audio generator. I also happen to be partial to Boatanchor test equipment for Boatanchors, such as using my trusted Simpson 260 meter, instead of a state of the art digital meter for measurement, because, in all probability, that was probably used in determining the resistance and voltage figures to begin with, when the manuals were first written. There is such a thing as "how much precision is enough", and , since the R-390 was originally manufactured and tested with analog equipment, that is what the measurements were determined with. If one were to use one's modern digital meter, one can fall into tthe trap of "decimal madness" and take the precision way too far. Basically, there is no real need to look at all the decimal places when working on this equipment. The same goes for a signal generator. The URM-25 is robust, rugged, complete with accessories, has built in modulation sources, and, like all tube equipment, rarely fails. I realize that some of my loyalty comes from having used this (the URM-25) and other such equipment in the Navy "back in the day", and finding it absolutely reliable, but that is the truth. It is reliable, and again, is what the manual, and most likely the manufacturers calibration and test department used when the 390's were shiny and new. < rant>< venting> I also carry this same theme through my other test equipment. My scope is "hollow state", I have an L/C/R bridge which is also "hollow state" and a frequency counter similarly "hollow state. Although I have a full stable of up to date, state of the art, whoop-de-do computerized equipment, I still enjoy using the older equipment because, frankly, I enjoy using it, and enjoy the sights, sounds, and smells from "hot vacuum" and the deposits of many years of cigarette tar on various items. Although I no longer smoke, it brings back memories of far better times, when one was allowed to indulge ones pleasure without shrilly screaming soccer moms telling me what I should and shouldn't do. I also enjoy remembering the era when we did, actually, have a

manufacturing base here in the good old US of A, and electronics people were a sought after commodity.
< /rant> < /venting> (Big Evil Grin) All the above being said, I can't think of a better signal source than the URM-25. Like the "Energizer Bunny (TM), it just keeps on going and going. The frequency range covers EVERYTHING in LF-MF-HF communications which I am liable to run into in the natural course of things. If one carries out proper maintenance, and uses deoxit, etc. etc, one doesn't have any problems.

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Suggested Test Equipment for R-390A Alignment ??
Date: Tue, 8 Apr 2003 20:41:47 -0500

I used a URM/25 for a while until I picked up a nice HP-606A.(gave away the 25) Probably the same vintage as the R-390A....larger than the URM/25 but I think easier to use. (personal opinion) I also have a HP-8640B and love it but it don't go down to 500Khz...unless you use the audio out as the generator at that freq.

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Suggested Test Equipment for R-390A Alignment ??
Date: Tue, 8 Apr 2003 22:08:49 -0500

Mike is right...the 8640B does go down below 500Khz. I was confused...I picked up the 606A because of several radio's I have that use 50Khz IF's....not 500Khz as I stated. I have a couple Halli's and HQ series Hammarlunds.... All that said...the HP-606 is a good alternative for the URM/25 if one wants something closer to Lab Grade for someone working on an R-390X series or any of the above mentioned. Cost is about the same...

Date: Tue, 8 Apr 2003 22:20:27 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] Suggested Test Equipment for R-390A Alignment ??

Most any signal generator that covers the required frequencies will do for an alignment. To measure the receiver sensitivity requires a well shielded unit with a good attenuator. The Heathkit lab grade signal generator need not apply here.

URM-25's were the standard Navy signal generator during the era of the 390's so are in the offical proceedure, but not required. They were widely available surplus and cheap so became popular with the radio hobbyist. Best generator here is a Logimetrics I picked up at the swap meet for $20. a few bad spots on the output attenuator, but easy to use an external attenuator instead. Anyone interested in a HP-606A for $ 50? Pickup only, near San Diego.

Date: Fri, 09 May 2003 11:19:08 -0400

From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] OT (CHEAP DVM'S)

The original poster mis spelled the maker of the thing. It is Cen Tech not Gen Tech, (I think.) I found it yesterday but today the search function is not working. If you can get a listing of meters, then find the more expensive meter by the same company to confirm the spelling.. the cheap meter is not listed if you search for "meter" or "7-function". Then search on the correct maker's name, once the search engine is running again. There seems to be no good catalog browse function on the web site. It's all very frustrating.

From: "Laird Tom N" <LairdThomasN@JohnDeere.com>
Date: Fri, 9 May 2003 10:50:32 -0500
Subject: [R-390] RE: CHEAP DVM $2.99

It is Cen Tech. Item number: 30756-4VGA

Date: Fri, 09 May 2003 11:10:20 -0500
From: Tom Norris <cthulhu@fhtagn.org>
Subject: [R-390] Comment on the CenTech DMMs

I bought one, and took it to work with me to the cal lab and put it on the Fluke 5720 calibrator. The darned thing is pretty accurate. I say get one for each tool box at that price and a couple for spares if they are all that good. Have bought other models as gifts off the E place, and they seem to check out as well. Can't vouch for the durability or how well they will stay in cal in the long run, but for ham and home use, and for the price it's a bargain. You want a super hand held meter, then buy a Fluke model 89 or something. An affordable rugged meter, get a Fluke model 12 (under $100 usually) but a decent "knocking around meter" get a couple of these.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] RE: CHEAP DVM $2.99
Date: Fri, 9 May 2003 11:14:54 -0500

Looks like all us hams looking for "cheeepie" DVMs have brought HF's server to its knees... :)

From: Buzz <buzz@softcom.net>
Subject: Re: [R-390] RE: CHEAP DVM $2.99
Date: Fri, 09 May 2003 11:09:47 -0700

I've had one of these meters for a few years and after a few months one of the digits became intermittent. Opening the case revealed that the lcd was a pressure fit to the contacts. I cleaned the contacts with an eraser then reformed, (I was taught long ago that you never "bend" anything) the contacts to provide more pressure and the meter has worked well ever since. BTW, it reads within a few tenths of my Fluke 87 III. As for the Taiwan machine tools..... I consider them a work in process.

From: krk@ix.netcom.com
Date: Fri, 09 May 2003 18:10:10 -0700
Subject: [R-390] Re: OT (CHEAP DVM'S)

Actually H.F. has two different meters. One which is part no. 30756 is the one they have on sale at $2.99 while the other one is part no. 35761 which is on sale at $3.99. The difference is the 35761 has a couple of greenish LED backlights for the display which can be turned on/off with a slide switch located in the upper left of the panel. I have both of them in front of me. I just tried them on a 1k ohm .005% lab precision resistor and the 30756 said 1002 while the 35761 said 998. They say it does +-0.8% of range +-2 digits. Looks like they are close enough for $3 or $4. If you can get the 35761 for $2.99, you scored a buck. Either way they come with the 9 volt battery. BTW - the panel lights work well. Just like a .45, I keep one in every room plus one in the truck <grin>. Durn those Chinese <nuther grin>.

From: "Darryl Jones" <sherri-darryl@erols.com>
Subject: Re: [R-390] Re: OT (CHEAP DVM'S)
Date: Fri, 9 May 2003 21:24:14 -0400

"handling" is $5.95 though above the shipping cost, which makes it pretty much a regularly priced DVM @ Rat Shack :(

From: TheFirebottle@aol.com
Date: Fri, 9 May 2003 21:35:24 EDT
Subject: Re: [R-390] Re: OT (CHEAP DVM'S)

Heh..heh...There had to be a catch..... I regularly work around high voltages in the industrial chiller business, I don't think I would want to trust one of those on 660 Volts. Just my 2 cents worth.

From: "Jim Simmons" <jimsim@adelphia.net>
Subject: Re: [R-390] Re: OT (CHEAP DVM'S)

Date: Fri, 9 May 2003 21:55:08 -0400

Strange, when I went in to pick one up the only thing the tacked on was the sales tax.

From: "Darryl Jones" <sherri-darryl@erols.com>
Subject: Re: [R-390] Re: OT (CHEAP DVM'S)
Date: Fri, 9 May 2003 22:02:24 -0400

Qty Item Description Price Item Total
1 30756-4VGA 7 FUNCTION MULTI-TESTER 2.99 2.99
Subtotal 2.99
Tax Rate 0.00000
Tax Amount 0.00
(DE) - (2.95) *Shipping 2.95
Handling 5.95
Total 11.89

Maybe it's to do with my zip being on the east coast?

From: "Kurt" <r390auser@cox.net>
Date: Sat, 17 May 2003 14:24:43 -0700
Subject: [R-390] ME-26D/U

I recently picked up a ME-26D/U, multimeter with the tip of the RF /AC probe broke off. Does anyone have or know where I can get a replacement cap with the probe tip or a complete probe or a junker ME-26D/U with a good probe/tip ?

How many of these units are in use by members of this group ? Is there anything to look for in getting one up and running ? Any caps that did to be changed ? Any special tricks needed for calibration ? Any help greatly appreciated.

From: "Michael Melland" <w9wis@charter.net>
Subject: Re: [R-390] ME-26D/U
Date: Sat, 17 May 2003 17:04:48 -0500

The ME-26D/U is a militarized version of the HP-410B. I had one and the probe tip was broken off too..... I just took that cap off and made a new probe tip and installed it. The manual is available on the net if you need one.

It serves as the maint manual for both the 26 and 410B. Hardest part of the meter to find will be a probe diode tube. It's a Eimac 2-01C and I've seen them listed for up to $125 each if you can find one. I have several nos .... I don't think they ever switched the 26 to the EA-53 like HP did.... that's even rarer and more expensive.

From: "Kurt" <r390auser@cox.net>
Subject: Re: [R-390] ME-26D/U
Date: Sat, 17 May 2003 16:09:01 -0700

Please tell me how you made your new tip for the RF probe. Looking at the inside of mine, all of the metal parts seem to be potted and do not turn even though from the outside the tip appears to be threaded. You are correct in that the D model has a different RF probe from the HP 410B.

Is it possible to put a 410B probe on the ME-26D/U ? The two different rectifier tubes you mention do not appear to be interchangeable. Any thoughts on this?

From: "Steve Hobensack" <stevehobensack@hotmail.com>
Subject: Re: [R-390] ME-26D/U
Date: Sun, 18 May 2003 08:25:04 -0400

The probes should be interchangeable but I think there might be 1 volt difference in the filament voltage. As I remember , the plastic head was difficult to unscrew from the body, but it does dismantle.

The input cap is a disk ceramic (without a coating) and it is easy to burn out by putting more than 300 volts AC across it. I put a miniature toggle switch on the meter front plate to turn off the probe filament when I use the meter for ohms or DC.

Date: Wed, 4 Jun 2003 06:48:19 -0500
From: Dave Merrill <r390a@rcn.com>
Subject: Re: [R-390] Fuse lamp in TV/7 Tube tester.

>My Fuse lamp is blown !!! In the TV/7 manual it says it is a type 81, the lamp I >have is a type 83 on the side of the lamp (probably why it has blown)
>Any one know of a source ? What are the specs on this lamp Volts / Amps ????
>I live in Australia, don't have a source here. Could some one ship me a couple >and I will reimburse them, please.

The # 81 is a 6.5V 1.02A lamp, originally for auto service when US cars were 6 volts. Here is a supplier who ships worldwide:
http://www.vacuumtubesinc.com/index.html

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Meter Meister?
Date: Sun, 15 Jun 2003 00:29:27 -0700

> I need someone to tell me what I just did to ruin this DC voltmeter.

You probably didn't do anything, but you can fix it.

> I was checking the voltage on a UPS when my Steel Six meter decided to crap out!

Not good, I liked that meter! Many meters have this problem.

> It seems to have either demagnetized the magnet or magnetized the vane, not >sure which. The coils are OK because when I reverse the probes the needle is >drawn below zero, it just won't go above about 2 volts on a 50 volt scale.

Nope, the problem is likely a very small iron fragment that is jamming the mechanism.

>If there was an AC component on the DC I was measuring would it have done >this? The charger was on, I was trying to determine if the batteries were >charging.

Nope. Here is how you return the meter to service:
(1) take the meter apart, exposing the mechanism.
(2) prepare very thin strips (1/16") of regular Cellophane tape.
(3) With (stainless steel) tweasers or some other tool, run the thin strips along the armature, and between the magnet and the meter windings. Metal particles will stick to the adhesive on the tape. Examine the strips. If there is the slightest fragment on the strip, replace it with a new strip, and continue until the strips come out clean. Change strips often, for particles can be rubbed off the strips can re-contaminate the meter movement. This operation is best done

under a magnifing glass. Be careful not to damage the spring or you may really lose the meter.

(4) Gently blow across the meter scale, moving the pointer. You should be able to very gently position the meter pointer at any point on the scale without touching it. If it sticks at any point, there are still magnetic particles jamming the mechanism. Continue cleaning with additional tape str ips.

(5) When the movement is free, clean the inside of the glass and reassemble the meter. It will work as new.

(6) If you did crunch a spring (there are two, one on the top and another on the bottom of the movement), use a small pointer to very gently bend the anchor points so that the spring doesn't rub against itself at any point. It should form a level, symmetrical spiral about the pivot. Resetting the spring is a very delicate operation that takes some experience. If you are working with a valuable meter, you might practice on another meter first.

From: "Steve Hobensack" <stevehobensack@hotmail.com>
Subject: Re: [R-390] Meter Meister?
Date: Sun, 15 Jun 2003 11:11:57 -0400

If there is no foreign matter in the meter movement, one or both of the protective diodes might be shorted. They are mounted in parallel (but opposite in polarity) across the meter terminals.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Meter Meister?
Date: Sun, 15 Jun 2003 11:33:27 -0400

If it isn't particles or a bad protective diode, it may be that the armature has come off one of its bearings or is loose. Depends on the design, but many meters have needle bearings which are adjustable. It's sometimes difficult to spot because just the very tip of the tiny shaft may become warn enough to slip out of center and jam. Usually the needle won't move at all, but I've seen cases where they'll move partway in one direction. If the meter has adjustable bearings, you can loosen a locknut and turn in the bearing slightly to tighten it up. If that's the case, be careful not to overtighten and make sure the shaft lines up straight as you do so or you'll damage what's left of the pointy end of the shaft or bend it altogether. (Center the shaft somehow and just tighten a small amount, then blow on the needle to see if it swings freely. If/when it does -- stop. A bit too much and the needle won't move, then back off a smidgen.) Often these adjusters are secured with a droplet of glyptol or cement. Usually a partial situation is obvious because when the shaft is crooked, the needle hits the scale, but sometimes it's the "tail" of the needle or some other part that

binds because it rubs up against something, or even the spring itself gets out of sorts due to the misalignment. Those situations are not so obvious.

Date: Sun, 15 Jun 2003 20:26:55 -0400
From: Gene Beckwith <jtone@sssnet.com>
Subject: Re: [R-390] Meter Meister?

Excellent post...and a frustrating subject for the casual meter repairman... Agree with ur assessment that sounds like pointer/vane is somehow out of alignment...but the blowing technique is a good test...also have used a very thin/narrow bit of paper to "Gently" touch, or prod the movement to check for rubbing or scraping. Btw...have found that on some "Hamfest" specials...that the glass has worked loose and has pushed the pointer back against the scale...sometimes, the glass doesn't look like it moved, but has been pushed in enough to cramp the pointer...and stay jammed so the glass doesn't "rattle...just another check Joe...but sure you thought of this one...it's easy to fix...but again am sure u check this one because it's a classic...

Now...further questions...

Barry . . . Do you have any pet suggestions regarding tools, and handling techniques for these ultra delicate manipulations....I've used the "blowing" technique to check for free movement, bits of paper cut to small manipulators, re-machined nut drivers to reduce over-all od...and re shaped screw drivers of various breeds...and types... In some cases I've had great success, but in others...seems the most common meter repair problem has been an "apparently" open coil...yuk...not a good situation...and have not had luck solving that one...even with resoldering micro joints...so I assume in these cases, it must be open some place I can't isolate other than the coil... Just ramblings, but meter info always of interest...

Date: Sun, 15 Jun 2003 20:36:26 -0400
From: Gene Beckwith <jtone@sssnet.com>
Subject: Re: [R-390] Meter Meister?

Another great post...re the sticky tape...I tried the sticky portion of a post it...with some scucess...but like ur tape suggestion too... What kind of "probe" do u use to manipulate the spring...?

Date: Sun, 15 Jun 2003 17:41:55 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Meter Meister?

Update, so far, This meter is in a 5 3/4" square copper plated steel box painted black, 3 1/4" deep, the mirrored meter is 5" wide and 2 3/8" high, the coil is HUGE by most meter standards 1 1/8" X 1 3/8", the moving coil is inside an aluminum doughnut. There are no protecting diodes of any kind, just two coils, evidently series resistors. BTW, there are three tiny balancing nuts on the needle placed at 90 degrees apart from the needle itself. Mostly it's a bare meter movement. I have a similar DC current meter to pair with it if I can keep it working. The needle is free, responds to full scale with the puff test, smoothly, too. It's not, however, my biggest meter, that's a Welch that's 14" X 14", YES, the ones you saw in high school science class! The Steel-Six came from the USAF and is due to be calibrated again in 2006! That's why this is such a bugger. Anyway, the meter glass had been replaced before I got it because it was plexiglas, I just put in a new piece of REAL glass, no telling what went in there over its life time, but it is dusty in there. Thanks, good suggestions,

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Date: Sun, 15 Jun 2003 21:59:42 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Meter Meister?

<snip> Probably not particles or misalignment of the armature then. Sometimes I've come across such severe static that a meter won't zero -- just hangs wherever you point to on the "glass". (Mostly happens with plastic lenses.)

I doubt if that's it given the vintage and so on and that usually clears up sitting around or when subject to some current. Have you tried running the meter out of it's case? Does it have a range switch with precision resistors. Maybe one is bad. You said it won't go above 2 volts, but will peg with reversed polarity -- how much swing between zero and "peg left"? Might be 2 volts or less. Does it have other ranges?

Date: Sun, 15 Jun 2003 22:30:38 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Meter Meister?

As for tools, a jeweler's screwdriver/nutdriver set and improvising (like you, with paper, toothpicks, etc.) As for handling -- verrrrry careful. You have to be particularly careful with steel tools around them that can snap to the permanent magnets. Also be careful just moving your hand away -- there's a tendency to snag things. Sometimes you can manipulate the shaft back in place by finessing the outer turns of the spring - very lightly bumping it. And after all that, it's not a sure thing. Might be worn out or an open coil. A true meter mechanic can go as far as rewinding them, but that's beyond me. Very expensive, I hear.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Meter Meister?

Date: Mon, 16 Jun 2003 00:09:22 -0700

Thank you for the compliment, Gene. I don't have any specific tool, just grab what is handy. It might be a toothpick (non magnetic), or a pair of stainless steel tweasers I picked up somewhere. Also use a small tip screwdriver. If real trouble is found with the spring, it can be usefull to temporarily unsolder it from the small mount that normally protrudes from the meter bridge. The spring can be reformed, and then positioned so that there is minimum deformation when it is resoldered to the post.

Date: Mon, 16 Jun 2003 09:16:46 -0700 (PDT)
From: <jlap1939@yahoo.com>
Subject: [R-390] Meters and things

Enjoy the material on damage and dirt in meters. It is an interesting thread that has a number of applications... Thanks to those who sent private responses about r-390 SSB. They were appreciated.

Date: Mon, 16 Jun 2003 16:25:03 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Meter Meister?

Nope, no ranges, no resistors except the two coils on the back panel. One wire goes directly from the terminal on the side of the box to one end of the coil, the other wire goes from the other terminal to the two resistor/coils in series, then to the other end of the coil. Simple, very simple,..... just doesn't work much. Reverse needle movement doesn't peg, only about the same as forward movement.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Meter Meister?
Date: Mon, 16 Jun 2003 20:54:48 -0700

Sounds to me like something is open. Set an ohmmeter on a high scale, then measure from outside terminal to resistor, through resistor, to meter, then to the small terminal that holds the spring, then to the other side of the meter (watch meter movement here), etc. Test from both meter terminals. The meter current passes through the springs to the wiring in the armature. Have found metal-to-metal contact can still be an open electrical path, particularly the hardware between the meter bridge and the spring.

Sometimes just moving things around will break down oxidation. Don't think that is the case with yours, though. You might look for a broken or disconnected spring (though that would affect meter zero), or open armature. If you see a lot of life in the meter movement (let's all hope) then one of the series resistors has opened. If the armature is open, you might try looking under a very strong magnifying glass (as in a lab microscope) to insure the wire contact between the armature and spring terminal is still intact. Have fixed a meter or two by reattaching a loose or broken wire end. The wire size is extremely small. Of course that is a very delicate operation. If the armature winding is broken somewhere inside the winding, that may be fini, would be for me.

Date: Tue, 24 Jun 2003 09:19:28 -0400
From: K2CBY@aol.com
Subject: [R-390] URM-90 LCR bridge question (OT)

I've used a URM-90 for a number of years and have found it to be highly accurate, effective, and pretty straightforward to use. The built-in 1000 Hz generator is adequate for most all purposes. The URM-90 is not really great for extra-low values of inductance and capacitance (<10uH, <100pF) but it's adequate. For RF-scale values you're better off with a grid dip meter (or a Q Meter if you want to get really fancy). Where the URM-90 really excels is making up or picking precision value capacitors from, say, 1000pF to 0.1uF to make up audio filters, phase shift networks, or timing circuits. It also works well in sorting through junk box inductances, expecially chokes and iron-core audio frequency stuff. A more generally desirable instrument might be the ZM-11/U R-C-L bridge. It has only about half the accuracy of a URM-90, but it allows you to make leakage measurements at voltages up to 500 and also permits you to measure the value of an electrolytic capacitor with a DC voltage impressed on it. It's probably more useful than the URM-90 in determining the "GOOD - BAD" state of a capacitor. It also seems a little easier to use than the URM-90 -- takes less time to find the balance point. Like the URM-90, the ZM-11 uses an internal 1000Hz oscillator as the signal source. The main difference apart from precision is that the URM-90 permits the DC measurement of resistors, while the ZM-11 uses AC for all measurements.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] URM-90 LCR bridge question (OT)
Date: Tue, 24 Jun 2003 09:04:59 -0700

Does anyone have a spare manual for the ZM-11/U?

Date: Tue, 24 Jun 2003 11:29:45 -0500
From: Dave Merrill <r390a@rcn.com>
Subject: Re: [R-390] URM-90 LCR bridge question (OT)

There is one on BAMA: ftp://bama.sbc.edu/downloads/miltest/zm11u/

Date: Wed, 25 Jun 2003 08:52:11 -0400
From: K2CBY@aol.com
Subject: [R-390] URM-90 LCR bridge (Bill Smith) ZM-11 Manual (OT)

The ZM-11/U manual posted on BAMA leaves a lot to be desired. Apparently it is a preliminary draft based on the prototype, rather than the production unit. A lot of the component values shown on the BAMA parts list and schematic are high precision specialty parts while the box itself uses garden variety 5% and 10% parts for most everything except the bridge standards and the meter multipliers & shunts. The biggest problem is that the BAMA voltage/resistance diagram and chart are incomplete. A lot of the values are shown just as lettered footnotes, but the footnotes table is not present. To further complicate matters, there is also a ZM-11B/U model which, I am told, uses a slightly different tube lineup. I posted a query similar to yours to the "Milsurplus digest" page a week or two ago and was referred to "
http://www.pacificsites.com/~brooke/CDW.shtml". Fair Radio also advertises a reproduction of a ZM-11/U manual. I have been trying to find out (without success) which version of the ZM-11 these offerings describe before I shell out hard money for either. Any help? Clues?

From: "Sam Doughty" <sdman@cableone.net>
Date: Sat, 29 Nov 2003 20:28:43 -0600
Subject: [R-390] Deoxit

Thanks everybody for the info on the Deoxit. Another question: What's a good signal generator for the 390? Looks like the URM-25 series is a good choice, also the HP8640 might be a good one.

From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] Signal Generators (was: Deoxit)
Date: Sat, 29 Nov 2003 10:00:05 -0500

I had the URM-25 for a while, but it is harder to use and does not get down to the low signal levels you need to measure sensitivity on the R-390A.Even with attenuators inline, it leaks too much signal to be accurate for low levels. I now have the HP 8640B with options 1 and 3. This is a really nice signal generator, includes a frequency counter, is accurate at low levels, etc, etc. If mine ever broke beyond repair, I'd have to quickly find and buy another one.

From: "Cecil Acuff" <chacuff@cableone.net>

Subject: Re: [R-390] Signal Generators (was: Deoxit)
Date: Sat, 29 Nov 2003 09:56:33 -0600

Another excellent option and much more inexpensive than the 8640B is the old HP-606 A/B. They are built like a tank and seem to last forever. Very easy to use and a true boat anchor in it's own right....

From: "Don Reaves W5OR" <w5or@comcast.net>
Subject: RE: [R-390] Signal Generators (was: Deoxit)
Date: Sat, 29 Nov 2003 11:18:46 -0600

I second the HP-606 boatanchor nomination, especially the HP-606B model. It has a high level secondary output, independent of the calibrated output, that is useful for connecting to a frequency counter. As Cecil says, they are built like tanks, and the only trouble I've had with mine is that the grease in the band turret got old and gummy and finally prohibited easy band changing. I used a degreaser to soak out the old grease over a period of a week and then applied new lubrication. Works like new. Be careful buying signal generators - they often have the attenuator fouled up and you will need a functioning calibrated output for tweaking your R-390.

The URM-25 is the genny called out in the manuals. They are much smaller and compact and a bit harder to work on should you need to repair one. But it is the classic choice.

I've never owned an 8640B but you can trust Walter's recommendation. 8640s are on the workbenches of Chuck Ripple and Rick Mish. Be sure you get one that does not have the attenuator burned out.

A friend who is tuned into the used test equipment market says prices for high quality older test equipment are just absolutely sinking. So it's a great time to upgrade your workbench. At a recent Texas hamfest test equipment was nearly being given away. For example, I picked up an HP-3586B Selective Voltmeter, an HP-3330B Synthesizer, and several Watkins Johnson counters. The pile was less than $200. Manuals for this stuff will probably cost more than the equipment. <snip>

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Signal Generators (was: Deoxit)
Date: Sat, 29 Nov 2003 13:17:44 -0600

Just as an addition to my earlier comments. I own both the 8640B and an 606A and love them both. (use them in my R-1051 business) I know it's not proper to mention it a lot but I purchased just about all the test gear I own from the "Auction" site and have had nothing but good luck with the folks I have dealt with. Test gear is very reasonably priced there. You can expect to pay probably

around $800 for a good working 8640B and can pick up a nice 606 when you can find them for no more than $100-$125 usually. I found the URM-25 not as straight forward to use and had to keep opening it up to fix little problems that showed up! I prefer to fix radio's instead of test equipment....

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Signal Generators (was: Deoxit)
Date: Sat, 29 Nov 2003 13:25:38 -0600

Well just another update....I was wrong on the pricing of the 8640B's...the market has gotten softer than I knew...Looks like one can buy a nice one for $300 to $400 bucks...that is a steal of a deal on a very nice generator....They were double that 2 years ago! I may buy me a spare just for the parts at those prices!

Date: Sat, 29 Nov 2003 15:59:45 -0800 (PST)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] Signal Generators (was: Deoxit)

I've got a HP 606A I'd sell reasonably to someone that would pick it up in the San Diego, area. Don't want to pack and ship.

From: "Don and Diana Cunningham" <wb5hak@sirinet.net>
Subject: Re: [R-390] WTB R390 Knobs
Date: Sat, 29 Nov 2003 18:14:38 -0600

James If no one comes forward, I noticed on the Fair Radio site today that they still show some of the small and medium ones.

Date: Sat, 29 Nov 2003 21:37:27 -0600
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Deoxit

The URM-25 (I have a "D") is OK, but hands down the 8640B is at the top of my personal "best affordable siggen" list. Mine has Options 1, 2, and 3, and it is an absolute mainstay here, along with the Tek 465B scope and the Fluke counter. Now I gotta get some more Good Stuff.

From: "JamesMiller" <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] Deoxit

Date: Sat, 29 Nov 2003 22:38:19 -0500

I have an 8640B with all except the low freq. option. It doesn't go below 500 Khz now, and it would be real nice to have it go down to 455 khz to do IF deck alignments. How hard is it to find a low freq. option and add it to an 8640B?

Date: Sun, 30 Nov 2003 09:12:29 -0600
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Deoxit

> ..... How hard is it to find a low freq. option and add it to an 8640B?.....

As I remember, the HP designers _explicitly_ built the 8640B so that the real low end would be 455 KHz or a bit lower, just so it _could_ be used for tweaking IF decks. I know mine goes down below 455 KHz: the low end is 447.8774 KHz this morning. Mine only has options 1, 2, and 3, and so there's no LF option involved. Maybe yours needs some retweaking, or to be looked at, or something? I certainly don't claim to be anything more than a user/ operator when it comes to the 8640B.

From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] Deoxit
Date: Sun, 30 Nov 2003 10:37:15 -0500

I'll ditto Mikes's remark, the couple I've used in the past made it down to 450 KC or so.

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Deoxit
Date: Sun, 30 Nov 2003 10:16:44 -0600

I agree with mike...mine goes below 455Khz as well...It has options 1,2 and 3 too...but I don't think it is any of those options that cause it to do that...

Date: Sun, 30 Nov 2003 12:30:58 -0500
From: "James M. Walker" <chejmw@acsu.buffalo.edu>
Subject: Re: [R-390] Deoxit

Try the Audio output bnc connector and the "Modulation Audio" output it has the same specs as the regular audio oscillators from HP. You just can't sweep the audio frequencies. However, and I am doing this from memory, I am pretty sure you can get down to around 5 - 10 Hz at the low end on the HP-8640B, with the audio out function.

From: "JamesMiller" <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] 8640 was Deoxit
Date: Sun, 30 Nov 2003 12:27:08 -0500

Well I must have had a brain slip. I tried it and yes 447 khz. Wouldnt you know. The manual says 500 khz is the low limit, and I never bothered to try it lower in the over coverage region. Thanks guys.

Date: Sun, 30 Nov 2003 12:32:39 -0500
From: "James M. Walker" <chejmw@acsu.buffalo.edu>
Subject: Re: [R-390] Deoxit

Sorry for the repeat, Also note the operators manual and also the service manuals are on the ETM LOGSA site, full manuals in PDF and free!

Date: Sun, 30 Nov 2003 09:33:49 -0800
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] Deoxit

The spec's say minus 10% on the low side and plus 5% on the high end.

Date: Sun, 07 Dec 2003 08:36:01 -0500
From: Michael Drum <mjdrum@comcast.net>
Subject: Re: [R-390] Signal Generators (was: Deoxit)

I wanted a 8640B years ago, but it was over my head price wize. I just found one on the auction place for $150 using the buy it now option! It is in working shape and looks to be in good cosmetic condition as well. I don't think I'm ever going to get one cheaper then that. Beware of a seller offering a manual download for the 8640B. It's available as a free download from the BAMA web site. This guy is trying to profit from other peoples work.

I told him he was selling Copyrighted work and he responded with the must vulgar language I've ever heard. I'm sorry to say he is a ham too...Guy actually charges a shipping fee for a download he is selling! He does not even provide a CD! He gets it from BAMA and puts it on his server, then charges the uninformed for the privledge of getting it from him. I reported him to Ebay and HP.

Date: Sun, 07 Dec 2003 08:59:39 -0500
From: Tom B <tbryan@nova.org>
Subject: Re: [R-390] Signal Generators (was: Deoxit)

8640B Manuals are also available from the Army website at:

Parts https://www.logsa.army.mil/etms/data/A/022731.pdf

Service? https://www.logsa.army.mil/etms/data/A/060577.pdf
Calibration https://www.logsa.army.mil/etms/data/A/063108.pdf

The 8640B manuals are freely available to the public but they are large files.
<snip>

Date: Sat, 31 Jan 2004 07:26:11 -0600
From: Jerry Kincade <w5kp@direcway.com>
Subject: [R-390] Cushman CE-15 Spectrum Monitor Manuals

Lots of these excellent monitors are still out there working in shops, but I found out the hard way CE-15 manuals are extremely difficult to find. I now have a limited number of clean, sharp 1st generation photocopies, complete with all foldouts, schematics, and parts lists, 3-hole punched and assembled, ready to drop into your 3-ring binder. $30 shipped to your door via Priority Mail anywhere in the lower 48. Please email me OFF LIST if interested. Thanks.

From: "Sam Doughty" <sdman@cableone.net>
Date: Fri, 4 Jan 1980 09:17:32 -0600
Subject: [R-390] Plastic Gears

Help!, my 8640B just busted a gear in the Range selector assembly. Would anybody know where I could find one or does anyone of you have a spare or a junker for sale? Was in the middle of an alignment and can't go any father.

Subject: RE: [R-390] Plastic Gears
Date: Mon, 2 Feb 2004 13:53:07 -0800
From: "David Wise" <David_Wise@Phoenix.com>

I repaired one of the bevel gears in mine. The plastic they used shrinks over time, and eventually gets so tight on the metal core that it bursts. I ground out the hole until when the break was squeezed shut it was a sliding fit on the core. Then I roughened the core and glued them together with JB Weld. A plastic wire tie held the break shut while the epoxy hardened. Not satisfied with this, I also reinforced the gear with a washer JB-Welded to its flat backside. (As with the main bond, I roughened the surfaces.) Being a bevel gear, the slight decrease in diameter was inconsequential. It's been trouble-free for a couple of years now.

This technique may also work on the spur gears.

One other thing. I found the detents to be ridiculously stiff on the Range and Deviation switches, and took out a couple of leaf springs from each. They're much lighter now (without being sloppy), which is very important for my unit as it doesn't have the original Range and Deviation knobs. No doubt the originals got their flanges broken off from the stiff detents!

Love my 8640B,

Date: Sat, 07 Feb 2004 08:49:00 -0800
From: Leigh Sedgwick <bipi@comcast.net>
Subject: [R-390] Advice - Proper Use of Meggers

I recently picked up a megger but, honestly, I don't know much about them. They are apparently great for checking leakage through caps which is the main reason I bought it. For the record, it is a old Navy unit made by Winslow Teletronics, Inc., Model ZM-63/PSM-35 with a Navy designation of AN/PSM-35. It measures Megohms resistance at 500V. I notice that I can vary the output voltage by rotating the crank at a slower speed but the readings fluctuate. So I take it, that the proper use requires rotating the crank at normal speed and full-voltage output? While 500V is fine for some caps, it typically exceeds some of the smaller caps found in receiver boat anchor receivers. So, does one need a smaller unit for lower voltage caps to get reliable readings. Sorry for my ignorance on the subject, I've just never used one of these. Can someone shed some light on this subject for me or point me at a reference for their proper use. Any manuals available for this animal? BTW, just finished tearing apart my RF deck and cleaning all the gears. I found that even a clean looking unit like mine was before I started, should be rebuilt...many gears were stuck together from hardening of the lubrication oil even though they looked quite good to the naked "eye". I'm looking forward to experiencing the "smooth" action of an R-390A. Hey thanks all... 73 de Mike K7PI Mercer Island, WA

Date: Sat, 07 Feb 2004 11:56:50 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Advice - Proper Use of Meggers

These are used normally to test high voltage cables, transformers,, and generator windings. I don't believe that testing capacitors is recommended.

Date: Sat, 7 Feb 2004 13:48:29 -0800 (PST)
From: <jlap1939@yahoo.com>
Subject: [R-390] Anritsu

Friends, In speaking of the "best" (one more time...!)... We know the test gear, but has anyone ever operated the early 50's, back to post war, rec.,by Anritsu? Have a family friend who still speaks English poorly, that was "the enemy" in

the early 40's, (tho' he is just a few years older than me),and he insists the mil equip around '45-'52+ was as good as could be had. (He came to this country in '55, at age 22...He was a japanese el. engineer, and continued in America....) As the modern equip. is so good, I wonder about the radios..

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Advice - Proper Use of Meggers
Date: Sat, 7 Feb 2004 17:26:39 -0600

The use of a hand cranked meggar was outlined in one of Chuck Rippel's videos on radio restoration...can't remember if it was the SP-600 video or the R-390..not important....It worked very well. Don't remember the specifics...

Date: Sat, 7 Feb 2004 18:32:41 -0500 (EST)
From: <ah7i@atl.org>
Subject: Re: [R-390] Advice - Proper Use of Meggers

Have your boy crank until he develops a fine sheen of sweat. If he is dripping, he's working too hard and will be useless by days end. There is also a risk of sweat drops affecting the local conductance. If he is not sweating, either he's not cranking enough, or it's too cold to be working. If the later, go sit by the fire and break out some scotch. Megger for sale. You can:

- Measure resistance of your ground system.
- Perform geophysical surveys to find ground water or minerals.
- "Coax worms from the ground" for fishing.
- Extract information from children as to WHY they were not cranking the megger fast enough.
- Stimulate plants "to produce SUPER tomatos"

Biddle, last calibrated 1995. Calibration should hold for at least 100 years. $400, seriously, I would not sell for less as this is a weeks RENT on one. pick up Canton GA, 30114

From: "Bernie Nicholson" <vk2abn@batemansbay.com>
Date: Sun, 8 Feb 2004 21:36:37 +1100
Subject: [R-390] Meggers

MEGGERS Hi guys I have always used a meggar for testing capacitors and high value resistors ,I have been an Electrician since the 1960 s , meggars come in various shapes and sizes 500 v is the smallest in Australia because it is normal to test insulation resistance at twice the applied voltage which here is 240v they also use 1000v meggars here to check Insulationt on line voltage circuits which is 415 here.

In the U.S.A this is 208v ,One thing I should say is DO NOT check capacitors that have a lower working voltage than 500 marked on them as they are likley to be damaged by the meggar also it is possible to charge up capacitors with the meggar and get quiet a shock!!!! also

DON'T check ELECTROLYTICS as they don't like AC . I had a very noisy IF module in a 390a and when I meggar tested the bypass caps they were ALL leaky , they were the axial black ones with the coloured bands around them after replacing them it is a different radio, I once had a tektronix 500 series CRO and the timbase would not work ,I got it from the gov surplus auctions-,it had an unrepairable tag on it .

I checked every component in the time base and couldn't find a problem but it refused to oscillate- then I disconnected one end off every component in the time base and trigger and holdoff circuit and meggar tested , on testing a 500pf mica cap it read 500megohms this was the culprit ,the timebases were Miller Integrator timebases and they rely for feed-back on the stray capacity of the tube and that 500meg resistor stopped in its tracks ,

I venture to surmise that not many instruments would show this fault so you can see that meggars are very handy with valves OR what you guys call TOOBES -BUT KEEP IT AWAY FROM THE SOLID STATE HI-

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From: "Derek Cohn/WB0TUA" <vibroplex@mindspring.com>
Date: Sun, 8 Feb 2004 11:34:45 -0600
Subject: [R-390] Boonton Signal Generator from Collins

I picked up a Boonton Signal Generator at a recent hamfest. The info on the top of the lid says:

"Supersonic Oscillator"
Type 210-A
115-230V 50-60 cy SER. 272
Boonton Radio Corp.
Boonton, NJ USA

On the back is a tag that says:
Collins Radio Co.

Engineering & Research Division

...so it sounds like it was a good tool in the Collins labs... I'd like to do a presentation on this piece of equipment at my next antique radio club meeting. I can't seem to find any info on it. I've poked around on the web and I see lots of references to a Boonton 211 but not a Boonton 210. Can any one point me toward a manual on this? Thanks for any help you guys can give me.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Date: Mon, 22 Mar 2004 09:29:53 -0600
Subject: [R-390] Signal Amplifier Needed

When I use my signal generator, I usually connect my frequency counter to the output to monitor and accurately set the generator's output. I know this is generally not needed, but for some things, accuracy is necessary. The problem I have is the counter needs a fairly strong signal whereas the circuit in question may need a very low signal so I end up switching the output level up and down.

It can get pretty annoying, especially when a very loud signal suddenly comes through the radio! Is there a simple circuit I could build, perhaps an op-amp or two, that could amplify the signal going to the counter while, at the same time, leaving the signal generator at the low levels needed for the radio? For example, I may need the generator set to 1mV, but the counter needs about 100mV to drive it. I'm not a EE design engineer, but I think a simple circuit could accomplish this. Are there op-amps that perform in the 100kHz to 30mHz range that could be used in a simple circuit for this? Am I dreaming to think this is
a simple endeavor?

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Signal Amplifier Needed
Date: Mon, 22 Mar 2004 12:58:47 -0600

I've gotten a few suggestions. Apparently it is possible to build an external amp to get enough gain. It became glaringly obvious, however, that the best solution is to use the "high-power" output on the signal to drive the counter while using the attenuated output for the radio.

I was thinking the "high-power" (2V) output was not 'ON' all the time, but apparently it is and this is one of its best uses.

Being a Neanderthal, I don't always know a wheel when I sees it.

Date: Mon, 22 Mar 2004 15:41:55 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: RE: [R-390] Signal Amplifier Needed

The X200K one.. oh yes. You didn't say you had a URM-25 (I assume you do.) It appears to me from the schematic that both the X200K output jack and the attenuator have signal when the output switch is in either of the X200Kpositions (10 kc to 300 kc or 300 kc to 50 mc.) Note, however, that the connection from the high level output to the counter, and then inside the counter can/will leak a lot of signal... so if you are doing low level sensitivity measurements, do not use the high level output and cap it off.

With even moderate leakage, it's possible to "measure" receiver sensitivities that are unbelievably low! (Leaked signal travels from the high level output and wire and counter to the receiver input and adds to the very low signal from the generator attenuator.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Signal Amplifier Needed
Date: Mon, 22 Mar 2004 15:11:44 -0600

Don't have a URM-25. This is the General Radio GR1001A. It currently has a plug in the hi output connection. (Shhhhhh! Don't tell anyone how I get those great sensitivity measurements...)

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Signal Amplifier Needed
Date: Mon, 22 Mar 2004 15:19:45 -0600

A quick look at the schematic for the GR1001A reveals the 2V output is not on all the time; however, it is much easier to switch to it to get the counter's reading and then back to the attenuated output for the "real" signal. A lot easier than building an amp.

Date: Mon, 19 Apr 2004 09:54:50 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] O.T. page for TV-7 tester

>I need a scan or a copy of page 65/66 for the TV-7/D tube tester.

The whole series of manuals is available for download free at:
http://www.kg7bz.com/Manuals.html

Date: Mon, 07 Jun 2004 21:45:17 -0400
From: Bernice & Al <saglek@videotron.ca>
Subject: [R-390] SG-25

Purchased a SG-25 Signal Generator last weekend at a local Hamfest for $15 CDN. Asking price was $20, offered 15 and he took it. Should have offered10. I bought it with the intentions of removing the main tuning capacitor to use in a crystal radio. Fair Radio sold them at one time for this purpose. The capacitor is a high quality part, ideal for high performance crystal radio. When I opened up the unit I just did not have the heart to part out such high quality piece of test equipment.The generator is in good condition. It operates well. O/P seems to be within spec for frequency and level. All functions work. The only problem is thatafter about 45 minutes of operation all modulation is lost. Could be the paper caps will change them out. I have a URM-25F which had a similar problem. After changing the caps the problem was still there. It finally turned out to be the meter diode. Found this by touching the diode lead with hot glass rod. The modulation dropped out within a second or so. Replaced the diode and the generator has been working for about 4 years now. I have number of questions about this unit.

1: What is the history.What are the differences, if any with AN/URM-25...? The unit is sure nice inside. Very clean but will be a problem if some caps down in the innards have to be replaced. The ID Tag has this printed on it.

Trad
STANDARD SIGNAL GENERATOR

MODEL SG-25 SERIAL NO. 544
TRAD ELECTRONICS CORP. ASBURY PARK N.J.

2: From what I can find out this is civilian version of the AN/URM-25, version C, D, I don't know?

3: Is there a WWW site with URM-25 history.

4: The front panel is not painted. The aluminium finish appears to be either a "silver" anodize or a clear chemical film. Similar to araldite. I would like to refinish the panel. Either redo in the original finish or paint.

5: The case is painted grey, about the same colour as the URM-25F.
It is stencilled with "AN-URM-25-D". Is this the norm.

6: The signal Generator came with these accessories.

1: IMPEDANCE ADAPTOR MX-1487/URM-25D

2: IMPEDANCE ADAPTOR MX-1487/URM-25D PART OF AN/URM-25H

3: TEST LEAD CX-1363/U PART OF AN/URM-25H

4: ANTENNA SIMULATOR SM-35/URM-25D PART OF AN/URM-25H

5: CG-409/U (0' 5')

(Have 2 of these. They are original with the aluminium cable marker. RG-58C/U coax.) Comments and advice on any repair or refurbishment would be appreciated. I also need information on the reliability of paper caps in the metal tube, with the one end soldered to the case for the ground connection. I have requested in with W.J. Ford Surplus here in Canada to rent, for thirty days, a manual. If I can't get one and any one out there needs any of the extra accessories maybe a trade could be arranged or trade for a missing accessory. That's it for now. Hope I didn't bore anybody.

Date: Tue, 8 Jun 2004 15:16:13 -0400
From: "Jim Amos" <jimamos@cisco.com>
Subject: RE: [R-390] SG-25

I bought a URM-25 C at Dayton in which the modulator didn't work. It also turned out to be one of the paper capacitors. After replacing the cap, everything worked great. It was one of the ones that was part of the oscillator function, and not a coupling capacitor.

Date: Mon, 12 Jul 2004 16:03:01 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: [R-390] DMM bounce

Hi, here's a general question related to making resistance measurements when an inductance is involved, e.g. the winding on an audio transformer. Generally, I make such measurements either with my BK DMM on a fixed scale setting or with a Simpson 260 old-style multimeter, and I usually have no problem. But recently I repaired an audio transformer and sent it to the lucky guy and he emailed that the primary was ok but his digital meter just bounced on the secondary and never settled on a reading. I thought maybe I made a bad solder connection. The approximate inductance of this secondary is about 360 henries. He sent it back to me and I measure it as ok, about 1500 ohms,

using my usual methods. I do notice that the reading shows a couple of high reading before settling down. This doesn't happen on the primary which is much lower inductance. My question - are there some DMMs, maybe the autoranging types, that have problems with such measurements. I could imagine this could happen depending on the rate at which it tries to "range" the reading but it would seem that it should eventually settle down. He tried it with two different digital meters and couldn't get a stable reading. I sometimes use this measurement method on 390a parts, hi. Hopefully waiting for illumination, Dan.

Date: Mon, 12 Jul 2004 16:51:50 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] DMM bounce

What frequency are your voltmeters calibrated for?

Date: Mon, 12 Jul 2004 23:28:43 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] DMM bounce

If you are using a trusty VACCUM TUBE instrument then you will have no problem with vacuum tube impedances. A modern super duper high speed auto ranging DVM will to just a little nuts trying to measure the resistance of your 360 Henry inductor. Some of them at least drive the device under test with a constant current source. This is fine for a capacitor or resistor. On an inductor the current ramp gives you a voltage ramp. Up goes the voltage and it auto ranges. Even if it runs a constant voltage it will still auto range if it's fast enough. The coil will look like an open circuit at first so the things little brain decides to go to a higher resistance scale. In either case you can get a situation where it just bounces back and forth with no tendency to settle at all.

Simple solution - hook a low voltage power supply (like a D cell) in series with the DVM and the secondary. That should give you about a milli amp though the secondary. Unless this is a very low level transformer the current shouldn't bother it to much. I use a similar setup for checking caps on the R390. A 60 volt power supply, a 5 micro amp DC meter and a 22 meg resistor all in series with the capacitor makes for a pretty sensitive ohm meter / cap leakage tester. You can use the same resistor in series trick to keep the current in the secondary low. In that case I probably would measure the voltage on the secondary and figure the resistance out by formula. Figure that kind of stuff out for a living and they make you a Lord .... Don't know if that helps or not.

Date: Mon, 12 Jul 2004 20:41:08 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] DMM bounce

Hi Joe, my DMM is BK 2905 calibrated with dc and for ac with 400 hz. I have no idea yet of details on the other guy's meters except I think they are autoranging type for ordinary dc and 60 hz measurements. I'll try to get more details on his meter but I don't think they are types for measuring much above 5 khz. I use my meter occasionally for measuring up to 5 khz, though I have no idea how accurate it really is up there but I use it to get voltage ratios for evaluating audio transformers.

I have checked it against my HP 403B meter and decided for what I was doing it was good enough. It reads about 3% low at 12 khz and close on up to 7 khz. Thanks for any thoughts on my question, best regards, Dan.

Date: Mon, 12 Jul 2004 21:00:40 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] DMM bounce

Hi Bob, ok, that helps. I wondered if the autoranging process did what you mentioned - and didn't allow the current thru the inductance to settle enough before the next range check. I never ran into this before with my meter which isn't autoranging. And the other guy evidently hasn't run into it with his autoranging meter either but this particular transformer has a high permeability nickel core that contributes to the high inductance compared to most audio transformers that I've run across. Most of them have about 5, 10 or maybe 20 H primary with corresponding 45, 90 and 180 H secondaries based on typical 3:1 winding ratio. I'm kicking myself for not suggesting that he try an old style ohmmeter before sending the thing back to me. thanks for the response, best regards, Dan.

Date: Wed, 14 Jul 2004 16:29:52 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] DMM bounce

Hi Joe and others, I confirmed that the problem was due to autoranging bounce combined with the high inductance of the secondary of the transformer. There's too much inductance for the meter to settle down and make a reading of resistance. I confirmed this with a small pocket RS multimeter that has only autoranging. On the secondary winding, it just keeps flipping from 0 to OL reading when trying to read the secondary resistance. On the primary, which is lower inductance, it flips once or twice then stabilizes on the correct 400 ohm resistance reading. As I mentioned, I had no problem reading this with my BK average quality, non-autoranging meter and I checked it with the $4 meter I

bought from Harbor Freight, which of course is not autoranging. The guy I sent the transformer to was using a Fluke meter on autoranging, which was the start of this escapade. The moral: never send in a man to do a boys job, and of course if you have a Harbor Freight model, you can send in a baby. And the Fluke can be trained for the job by turning off the autoranging. Thanks for the comments. I far as I know there are no inductances in a 390a that are large enough to cause this problem . But I have only a smattering of knowledge about the various ways that today's exotic meters perform all their magic. Dan.

Date: Wed, 14 Jul 2004 20:16:09 -0500
From: "Bill Hawkins" <bill@iaxs.net>
Subject: RE: [R-390] DMM bounce

If all you wanted was the DC resistance of the secondary, and all you had was an autoranging DMM, could you short the primary to calm down the autoranger?

Date: Wed, 14 Jul 2004 19:54:37 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] DMM bounce

Hi Bill, now why didn't I think of that !!! Z transformation or short-circuit reactance?? In either case, the input impedance is going to be lower. I tried it with the transformer in question and the pocket autoranging meter - it took 6 bounces before settling on the correct reading of 1500 ohms on the secondary. You have won my respect for thinking of trying that. Since it took 6 bounces, I suppose there is probably a meter out that wouldn't work with that solution if it has a faster autoranging rate, but then that would depend on how the particular meter sends current through the transformer to make a reading each time it does its autoranging routine. I like your idea, thanks for a great idea to try and it worked with the autoranging meter I have, one of those small toothbrush case RS models of about 7 years back. Dan

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Date: Fri, 23 Jul 2004 18:35:01 -0500
From: Harry Joel <hcjoel@direcpc.com>
Subject: [R-390] Manual For Fluke

Hello, I don't know if a Fluke Model 335A DC-Voltage Standard, Differential VM would be usefule for some measurements on BA's. I have acquired one cheap at an auction. Does any list member either have, or knows where to get a manual. I have checked BAMA, he does not list it.

Date: Fri, 23 Jul 2004 21:42:55 -0400

From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Manual For Fluke

There seem to be a ton of these showing up right now. I'm not real sure who is dumping them but I'll bet it's the government. Needless to say I picked up something similar. The neat thing about these items is that they have monstrously high impedance when they are set to null. I keep thinking that would make them a very good thing to use as a high resolution meter to watch the AGC voltage on a R-390. Being able to say for sure that your signal report is 1.237 micro volts and doing it with a tube radio seems like a fun thing to do.

Date: Tue, 28 Sep 2004 14:12:30 -0400
From: Rbethman <rbethman@comcast.net>
Subject: [R-390] TS-505 Manuals in PDF format available

I still have the TS-505 VTVM manuals available to mail to anyone whom asks for them. They are zipped and are 711KB in size.

Date: Mon, 25 Oct 2004 20:48:57 -0400
From: Bob Camp <ham@cq.nu>
Subject: [R-390] Tube Tester

One of the truly amazing things about the current surplus scene is that a reasonable military tube tester (say a TV-7) from the 1950's sells for almost as much as a reasonable military radio (say a R-390A) from the same era. By the time you buy a reasonable set of test gear you have invested as much or more than you put into the radio.

So here's the question:

Is there any interest in a "R-390A only" tube tester? As far as i can see you could make one with a handful of parts that would test all the tubes in the R390A except the rectifiers. It should do as good a job as a TV-7 on the R390A tubes. One advantage would be that the number of switches involved would be small. The ease of use factor on the simple tester would be significant if you check a lot of tubes.

Is anybody interested in a gizmo like this? If there is then it's probably worth figuring out how to do it. A lot of us already have tube testers so it may not be worth doing.

This would be strictly a "here's the schematic go to it" type of thing. I have no intention of trying to sell them or build them. All the wiring would be point to point stuff. The parts except for the tube sockets would all be Radio Shack type stuff. The tester should be a reasonable weekend project with plenty of time taken off necessary distractions like *using* radios.

If you are interested let me know. The only thing I need to know is whether you already have a voltmeter / current meter. If so what is the lowest current range it will show? The gizmo can be designed for a "plug in" meter or a built in. The design will be a little different depending on which way we go.

Parts list (more or less):

one 9 pin tube socket
two 7 pin tube sockets
two 6 volt filament transformers
one push button
one dpdt switch
one 1N4007 diode
3 - 6 0.01 uf caps
some number of resistors
a power cord, fuse and on/off switch.

Depending on the voting either a couple of pin jacks or a meter

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Date: Mon, 25 Oct 2004 21:21:25 -0500 (CDT)
From: jhhaynes@earthlink.net
Subject: [R-390] Tube tester

I have a friend with a couple of tube testers for sale. I mentioned it on several mailing lists, maybe not here, and he has got hardly a nibble of interest.
The guy who has them is ozregl36@aol.com

Date: Tue, 26 Oct 2004 07:15:04 -0700 (PDT)
From: djmerz@3-cities.com
Subject: Re: [R-390] Tube Tester

Bob, I would be interested in the circuit of what you propose. Not that I would likely end up building it but it would be "educational" to see how simply it might be done. There are other classes of tubes/older stuff that it might be useful for as well, best regards, Dan

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Date: Tue, 26 Oct 2004 11:57:11 -0400
From: "Veenstra, Lester" <lester.veenstra@lmco.com>
Subject: RE: [R-390] Tube Tester

However, to play devils advocate (and CTM) The best tube tester is the R-390 with a signal generator.

Date: Tue, 26 Oct 2004 12:51:09 -0400 (EDT)
From: John Lawson <jpl15@panix.com>
Subject: RE: [R-390] Tube Tester

With the possible caveat that one needs to be very sure of the 'goodness' state of all the other devices in the radio, else a complete, calibrated signal-trace is required to insure that all other stages, with the exception of the 'stage of interest', are of a known-on-spec condition. Otherwise, you get into the -two and -three and -nnn unknown variable chaos. That being said, using a "perfect" R390 for substitution testing of suspect tubes is fine, again with the caveat that you can meaningfully *and* accurately measure the change in the system caused by the substitution, and then relate that back to the Tube Under Test parameters. This gets easier if the radio simply fails (or smokes...;{) when the substitution is made. On the whole, my own preference is to use a tube tester of some kind.

Date: Tue, 26 Oct 2004 13:02:21 -0400
From: "Veenstra, Lester" <lester.veenstra@lmco.com>
Subject: RE: [R-390] Tube Tester

While tube testers are fine for gross checks, an evaluation of real goodness, that is, gain at RF, or at IF or at AF, or IF AGC Action, or, and particularly, front end noise, is best done by substitution in the receiver, finding better, best, or in many cases, does not make any difference, tubes.

The exercise of testing nominally good tubes in a tube tester and using that data as a predictor of which is the best in a critical spot in the receiver, is not one I would waste time with. Of course all the above is predicated having a receiver available that is in reasonable good condition. From that point, running substitution checks with the available stock, is a way to get reasonable condition up to really hot condition.

Still, would like to see design of the $1.95 do it yourself tube tester!

Date: Tue, 26 Oct 2004 10:26:45 -0700
From: Doug Millar <dougnhelen@moonlink.net>
Subject: [R-390] Best R 390A Tube Tester

The best R 390A tube tester is a set of substitution tubes. Most tube testers only measure tube performance at low frequencies and may not give a good picture of what the tube is like. I am trying to find an article written in the '50s

that described the workings of most tube testers and their limitations. The final suggestion was to use substitution.

Date: Tue, 26 Oct 2004 10:31:09 -0700
From: Doug Millar <dougnhelen@moonlink.net>
Subject: [R-390] The Fine Points of Tube Testing

I found the article on tube testers. Very interesting:
http://www.0wned.org/~hstraub/testarticle.pdf

Date: Tue, 26 Oct 2004 15:25:06 -0400
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] Tube Tester

Go to members.aol.com/sbench101 and you will find among other tube projects a design for a homebrew tube tester. It is a transconductance tester and incorporates adjustable DC power supplies to operate the tube under test at the same voltages used in an actual application. It was primarily intended to characterize tubes to apply them in audio amplifiers but will test our R-390x tubes. For the type of test we would like to do some features could be easily added: grid emission, shorts, gas, "life test". An adjustable constant current source in the cathode lead is used to set the tube current; that could be removed and the circuit simplified by grounding the cathode and using a bias pot in the grid circuit instead. (Caveat: makes it easier to over dissipate on small tubes.) The unit could be simplified also by removing the sockets intended for audiophile type tubes, removing facility for testing pentodes as triodes, removing triode mu testing capability. The power transformer/rectifier/filter could be eliminated and power "borrowed" from the R-390x by means of a tube socket plug or clip leads (fuse protected, of course). The aforementioned site has settings/ readings for testing many tube types; more can be found at another audiophile site: triodeel.com

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Date: Tue, 26 Oct 2004 21:14:15 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Tube Tester

I certainly will not argue that a tube tester is a perfect gizmo. A working radio will always be a better way to check a tube than any tube tester made.

That said a tube tester does have it's place. If you have a dead IF strip on your only working radio you need to start with something. DC voltages are one way to go, a quick run through the tube tester to find a dead tube is another way to go.

Probably the most use I have ever gotten from a tube tester was on a piece of gear that had been run so long with the same set of tubes in it that they all were low gain. Not a single tube in the set made it above about 1/4 of the "minimum good" reading on the tester. Needless to say with every tube in there near dead troubleshooting the thing was a bit much ...

The thing that bothers me the most is that pretty much all of us spend a lot of money on tube testers that do so little for us ...

Date: Tue, 26 Oct 2004 21:59:19 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Best R 390A Tube Tester

The reality of a tube tester is actually worse than it looks at first. Often they are set up to do a measurement that is affected by the DC current through the tube. A tube with high DC leakage will pass the test on a tester set up this way .... You can only do just so much with a simple tester

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Date: Wed, 27 Oct 2004 08:19:07 -0400
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: [R-390] Tube testers

I agree in part. The tube tester didn't catch the small filament-cathode leakage that plagued my noise limiter. That being said, I get a lot of tubes at flea markets and the tester lets me cull the duds. Emission testers get some but then I acquired a transconductance tester and the end results got a lot better. Everything has its place.

Date: Wed, 27 Oct 2004 20:53:06 -0400
From: "Michael Murphy" <mjmurphy45@comcast.net>
Subject: Re: [R-390] RE: tube testers

We are not that interested in DC gain or even DC Transconductance I think. Let's talk AC and High frequency. There probably are only four tube types in the 390 worth testing if you are talking about sensitivity and signal handling (which seem to be the hot buttons). I think these could be handled with a high frequency bench generator at say 500 kHz and 10 MHz, a chassis with wired tube sockets and a high gain low noise amplifier and finally a Scope or high frequency AC meter to test high frequency gain and noise. This would not be the simplest way to find "Good" or "Bad" tubes but it would be a possible way to find "Better" tubes with good high frequency gain and low noise characteristics.

Date: Wed, 27 Oct 2004 22:10:10 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] RE: tube testers

Pretty much what I am proposing is a simple transductance tester that runs at 60 Hz just like the TV-7 and TV-10 testers did. That makes the circuit fairly easy to build and just about any reasonable AC voltmeter can be used as the "detector" in the plate circuit.

A quick scan of the tube tester schematics suggests that a fixed bias goes on the plate and screen. A variable dc bias goes on the control grid along with about a volt or so of AC. I suspect we would use something like a dozen or so resistors to set the whole thing up for the tubes in the R-390.

The advantage of doing it this way is that the data from the TV-7 or TV-10 can be directly compared to our tester. This will give us a way to be sure that we got the design right.

I have never seen a frequency drop off in a tube. Certainly they do get noisy but they don't seem to get roll off problems. You can see capacitance variations but those are normally tuned out in the circuit. We could measure electrode capacitances and that would give us a pretty good idea of what is going on. I suspect that we wouldn't find out to much though ...

In order to measure high frequency gain on a tube we would need a tuned load to run into. The same thing would apply to the grid circuit. If you are going to do that we might as well just check them with a signal generator in the radio.

Noise figure would be a *very* interesting thing to measure on a tube by tube basis. The same issues about tuning the input and output circuits would apply but we might get some useful data. That project is a bit more involved than what I had in mind.

So I guess there's been enough interest. I'll go off and see what I can figure out for a circuit. When I do I'll let the group know.

Date: Thu, 28 Oct 2004 11:18:25 -0400
From: "Scott Bauer" <odyslim@comcast.net>
Subject: [R-390] Noise test

Well, since we are testing tubes this week, can somebody explain noise tests. I have the correct headphones which plug right into my TV-7. Now the question.

Is there a specific test or does one just plug the phones in and tap on the tube and listen for microphonics?

Date: Thu, 28 Oct 2004 21:22:41 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Noise test

You got the right idea. You can also catch odd clicks and pops this way.

Date: Tue, 28 Dec 2004 13:18:10 -0800
From: "Kenneth G. Gordon" <kgordon@moscow.com>
Subject: Re: [R-390] me radio ist bloken

> I hate to ask this, but what does a milspec tube tester go for in this lifetime

Depends on the tester. I looked some up on that auction place a couple of days ago. A TV-2B/U was going for over $300. A TV-7 was about $150 less. A Hickock 539 was going for over $600.Ya pays yer money and ya takes ur choice. Personally, I like the TV-2 I have here. I also have a Triplett 3444 which I like a lot.

Date: Sun, 20 Mar 2005 09:27:22 -0800
From: "S Majerick" <stevem@ci.steilacoom.wa.us>
Subject: [R-390] RE: B&K 1602 Power Supply question

Here's where you can order a manual for it:
http://www.bkmanuals.com/1601-2000.htm

Date: Sun, 20 Mar 2005 13:31:57 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Looking for TS-352 or AN/URM-105 or 1000ohm/tester

>I think the TS-352 is a battery powered meter. If was surplused out
>as it used some non standard shaped batteries. If you find a meter,
>you likely cannot find batteries.

If *I* remember correctly the TS-323 is a very heavy, indestructible VOM with cover and handle.. fine for boatanchor work but you have to move the probe lead to change ranges on it. Not all that convenient. Neat meter however. The batteries were two (?) three-cell batteries with screw terminals on top.. you can simply solder together three AA batteries and put them into the battery compartment. The batteries are only used on the OHMS scale. There may also have been a D cell for the lowest range.

If anyone has one of these and needs a manual, I think I have a copy here. I also have a manual for the TS-505 VTVM mentioned in the R-390 repair and alignment procedures.

The TS-223 is another animal, a much more modern, plastic cased unit that used mercury batteries. You can solder two sets of three AAA cells and put them inside the meter case just fine. The C cell it also uses is common and goes in the normal place for it.. The batteries are used on the ohms range, the mercury cells ran a single FET for the ohms detector circuit. The FET is NOT used on voltage measurements, so hamfest hawkers who tout them as FET-input meters are stretching the facts.

>I thought a TV 7 was a tube tester. What are you doing that is so
>exact that you are worried about the voltage reading you are getting
>from you today's meters with there higher resistance per volt?

Adjusting the signal voltage in the TV-7 is the most critical setting, I think.

Date: Sun, 20 Mar 2005 14:13:14 EST
From: Llgpt@aol.com
Subject: Re: [R-390] OT: Looking for TS-352 or AN/URM-105 or 1000ohm/v tester

Ah, the Federal Government in their all consuming stupidity always does something like this. The TS-352 series used 1 - D cell and 3 - 4.5 volt batteries. In their wisdom, they surplused them out because the 4.5 volt batteries are no longer available. That's the kind of thinking that has our country in financial trouble as I type. I simply take a couple of plastic battery holders, one for 3 AA batteries and one for a 9 volt battery. Let's see, 3 X 1.5 volts = 4.5 volts, 9 volts + 4.5 volts = 13.5 volts. Gee, why didn't "they" think of that??? I have refitted more of the TS-352 series than you can shake a stick at over the years. Good meter and if I had a spare, I would offer it to Gary cheap. I have bought them off the E place for years and refitted them. But, I'm only a low level Government Wage Grade employee, what do I know??? And, that's the way the Government spends your tax dollars and thinks folks, end of economics lesson.

Date: Sun, 20 Mar 2005 15:23:21 EST
From: Llgpt@aol.com
Subject: Re: [R-390] OT: Looking for TS-352 or AN/URM-105 or 1000ohm/v tester

The 9 volter's last looooonger.

Date: Sun, 20 Mar 2005 14:19:43 -0800
From: "Ed Zeranski" <ezeran@ezeran.cnc.net>
Subject: Re: [R-390] OT: Looking for TS-352 or AN/URM-105 or 1000ohm/v tester

I still have a '352 to go with contemorary Navy radios, as well as the PSM-4 that replaced it. I think the 4.5Vdc batteries are BA-31 and the pin jacks are less trouble than a wafer switch in the nasty shipboard environment...and probably cheaper too.

Date: Mon, 21 Mar 2005 23:58:11 EST
From: Flowertime01@wmconnect.com
Subject: [R-390] TS352 Meter

Yes, that was the meter with all the pin jacks. We used them on the bench and dragged them out to the bays. We liked them better than the 505 because you did not need to plug them into the AC line. The real problem with them was the probe tips. You forgot what you were doing and pulled the meter over. Likely as not you would break the pin off at the meter. Both ends of the test lead used the same probe tip. (also the same pin tip as used on the TS-505) The meter end of the lead had a short 1 inch plastic selves. While the user end of the lead had a 4 or 5 inch plastic sleeves. The tips were plated brass and threaded as 4x40. The tips would bend easy and break even more easily.Any one know where we can get the probe tips from today?

Date: Tue, 22 Mar 2005 11:34:46 +0000
From: rbethman@comcast.net
Subject: Re: [R-390] TS 505 Manual

try: http://home.comcast.net/~rbethman/ts505.zip

THIS will let you download it. I had one of those SENIOR moments. Of course trying to KEEP up with THEIR naming conventions HAS driven to the precipice

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Date: Tue, 22 Mar 2005 07:43:49 -0500
From: "James M. Walker" <chejmw@acsu.buffalo.edu>
Subject: Re: [R-390] TS-352 Batteries

Those are BA31 (4.5 VDC) and BA30 (your classic D-cell 1.5 VDC) they are still available at various places and prices:-->

http://www.voicenet.com/~sgphoto/batteries.htm
http://www.ibsa.com/estore/browse_category.asp?category_id=397208

For the reason the meters were surplused out! The battery manufacturing process included mercury.

http://www.emedco.com/emed2/resource/msds/msds_view.asp?pd=ba&pf=bklhr

Duracell makes a 4.5VDC battery that will fit in the spaces set up for the BA31 and connectors to adapt it inside theTS-352 are available at Radio Shack. I have and use two TS352 VOMs I find the ability to measure up to 5000 VDC quite handy. Find all of the manuals for the tester at http://eshop1.chem.buffalo.edu/test-bench-equip.html

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Date: Tue, 22 Mar 2005 06:44:52 -0600
From: Dave Merrill <r390a@rcn.com>
Subject: [R-390] Re: TS 505 Manual - On-Line

LOGSA has TM 11-5511 for the plain TS-505/U (without suffix).

https://www.logsa.army.mil/etms/find_etm.cfm

Date: Tue, 22 Mar 2005 08:26:55 -0600
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] TS352 Meter

If these are standard pin jacks and tips, Mouser sells them. You might not be able to have the #4-40 threaded tips, but I would think you could use a standard probe tip and use a pin plug on the other end.

Date: Tue, 22 Mar 2005 10:56:08 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] TS 505 Manual

I have them in PDF form and I see I got them from the LOGSA site:
https://www.logsa.army.mil

Scroll down to manuals online, or: go direct to:
https://www.logsa.army.mil/etms/online.htm
then "Accept"
then "enter the site"
search in the "title" field for TS-505

You'll find the three manuals:

PIN TM/EM Number Current Change Publication Title (partial)

<https://www.logsa.army.mil/etms/data/A/018850.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>018850
<https://www.logsa.army.mil/etms/data/A/018850.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>TM 11-6625-239-12
<https://www.logsa.army.mil/etms/data/A/018850.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>4
<https://www.logsa.army.mil/etms/data/A/018850.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>ELECTRONIC MULTIMETERS, TS-505A/U AND TS-505B/U AND MULTIMETERS, TS-505C/U TS-505D/U

<https://www.logsa.army.mil/etms/data/A/018851.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>018851
<https://www.logsa.army.mil/etms/data/A/018851.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>TM 11-6625-239-34P
<https://www.logsa.army.mil/etms/data/A/018851.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>ELECTRONIC MULTIMETERS TS-505A/U, TS-505B/U; MULTIMETER TS-505C/U AND TS-505D/U
(FSN
6625-243-0562)

<https://www.logsa.army.mil/etms/data/A/029316.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>029316
<https://www.logsa.army.mil/etms/data/A/029316.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>TM 11-5511
<https://www.logsa.army.mil/etms/data/A/029316.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>5
<https://www.logsa.army.mil/etms/data/A/029316.pdf?CFID=3052807&CFTOKEN=567ad9a35eec9d6b-CAF2D549-D78E-341E-81C4EBBEFC0EA931>ELECTRONIC MULTIMETER TS-505/U (TO 33A1-12-55-1)

Let me know if downloading them does not work. I can email them to you. I'd be glad to hear any tales you have about restoring your meters. I have at least one of them here, and it's a fine meter. A bit hard to read compared to some commercial meters with larger movements, but all in all, it's a fine meter.

Date: Sun, 03 Apr 2005 07:53:02 -0500
From: Mahlon Haunschild <mahlonhaunschild@cox.net>
Subject: [R-390] Speaking of TO-6As..

Was given a Sprague Tel-Ohmike TO-6A yesterday. Free was a good price in this case, since all of the paper capacitors in the unit need to be replaced, and also because the meter is blown and needs to be replaced. Not unlike what I went through with my Heathkit capacitor tester a while back (the two "standard" paper capacitors in it were so leaky the bridge never balanced; same thing is going on with the TO-6A). Has anyone ever run across a calibration procedure for these?

Date: Sun, 03 Apr 2005 10:39:04 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Speaking of TO-6As...

I'm sure the marketing departments at each of the companies that made them had long lists of exactly why theirs was the best on the market. From what I have seen they basically are all balanced bridge instruments. If you replace the "standard" capacitor in one of the arms the main issue is to hit the value correctly.
A reasonable way to do a quick check on any of these gizmos is to have a metal package tubular teflon dielectric precision capacitor sitting around. Value is not real critical as long as it's in roughly the same range as the R390 capacitors. Teflon caps have a very high insulation resistance. Metal can parts generally last a long time. You should be able to trust the markings on the part, even 20 years later. If the meter reads the indicated value and a very high insulation resistance (say > 50 gigaohms) the meter probably is working just fine for R390 purposes. There's nothing in an R390 that needs anything close to that kind of insulation resistance.

Date: Sun, 3 Apr 2005 08:47:00 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: RE: [R-390] Speaking of TO-6As...

Just looked at the manual downloaded from BAMA's website. Nothing in it on calibration or repairs, but it does have a parts list and schematic.

Date: Sun, 3 Apr 2005 14:27:06 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] Cap Leakage

Hi Bob, Dave, Lee et al., once again fine coverage here. I was thinking BAMA when someone mentioned T0-6a was used and that "insulation resistance"

was a standard measurement, at least for the TO-6a instrument. I didn't realize that - the only vintage capacitor checker I ever had left my hands pretty quickly; it was a cheaper variety and the only plus I could see for keeping it was that it actually put high voltage on the cap when checking. My interest was renewed by the discussion. So I had to take a look, which was a 2 hour download of the BAMA TO-6a 8 meg file on 56k modem but it was worth it. It looks like insulation resistance with the TO-6a is measured by matching instrument grid current to the capacitor leakage, with some appropriate resistances to scale the resultant current measurment in the plate circuit of the instrument tube. I would guess "nil" here is still a pretty high resistance, maybe in the 100 kohm range judging from the resistors in the circuit. The manual indicates 100 Megohm to 100KMegohm ranges so maybe the lower limit is even above 1 megohm. Maybe someone else knows the answer. I can't see the meter scale in the downloaded pic clearly enough to tell. Thanks for the clarification (only downside is I'll look twice at a T0-6a at some future swapmeet and be tempted), Dan.

Date: Thu, 07 Apr 2005 10:43:42 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: [R-390] Ramblings on Calibration - was: HP 8640B

Here are some ramblings about the topic of calibration:

On "Accuracy of Measurements":
The expensive cal labs have three or four things we normally don't:

1) Fancy, specialized equipment to do the calibrations with

2) Reference standards "traceable to NIST" which costs them to keep current

3) Well worked out, "accepted" and proven procedures

4) Trained, experienced people to do the work

For example, in the measurement of frequency, as done in the calibration of a signal generator, the lab might well have a satellite-connected local frequency standard that is continuously monitored for drift and error. This thing is part of a system that does the monitoring, allows for periodic higher-level calibration, reports it's condition, and provides suitable output frequencies for use in calibrating other equipment. Nowadays it's unlikely that such a frequency standard it actually sent to NIST for calibration because satellite transfer methods
exist. This establishes the "traceable" nature of that measurement. The procedures used in frequency measurements are probably not too complicated, but if you were to get a signal generator calibrated, you will be

paying them to have a trained, experienced technician carry out the measurements according to the established procedures. Measurement of frequency is easy out to 10^-12 or so, but that kind of accuracy in voltage and power measurement is not feasible. A check of the manual specs on the HP 8640 will show that the accuracy for output level is far lower than for the frequency.

On "Why do we do this?"

Some folks like John, KB6SCO, are responsible in an organization to make sure things are correctly calibrated. The organization's goals and customers require it and he has a full time job making that happen. Few Amateur radio stations need such calibration. Some Amateur radio folks WANT to know that their quipment is calibrated correctly. If a frequency counter is a little bit off, they won't like it, but a customer's crucial communications links won't degrade or fail. Some of us just like to mess with measurements and enjoy knowing our equipment is working right. For example, a while ago I got a General Radio Precision Capacitance Bridge that joins a similar inductance bridge here. I don't yet know if they are working right, but I expect to check them whenever I can. I have no earthly reason to measure inductors or capacitors to 0.05 percent!

On "What can we do about all this?"

For many of us, doing it at home is a fine thing. Getting an instrument and an invoice for a big amount back from a Cal Lab is likely not in our future. At home we can check frequency counters and generators with very small errors. receiving the WWVB signals at 60 kc is the start of a system that gets you well within the specifications of most oscillators found in frequency counters and generators. For a couple hundred dollars you can buy a standard oscillator (surplus from the cell phone industry, as I understand it) that is extremely accurate.

Measuring resistance, inductance, and capacitance is a bit more complicated, but you can find reference standards at hamfests or on the web that will make a start at a set of known values. As you dig into the methods of measuring these values you will begin to understand the value of the setup and the methods you use and how they affect the results. It takes a small table full of inductance standards to calibrate a high accuracy inductance bridge, and these things have sold at fests and auction sites for $300 apiece and more.

Measuring voltage is even tougher at home. Systems to measure voltage
to high accuracies is very complicated, often involving shielded rooms, calorimetric methods, quantum physics based references, and so on. Voltage reference instruments can be had on the used market the would be quite useful to check our DMM's however.

Careful web searching will reveal a lot of good information about

electronics calibration. The Agilent web site has interesting reading. For example, I recently found a publication on Tips for Making Accurate Measurements or some such title. Any one of the setup diagrams in that one included at least $50,000 worth of their equipment, so it wasn't all that useful.

The NIST website, www.nist.gov, has lots of papers and reports but you have do dig for them (the search engine is terrible!) and you'll read about methods and techniques impossible anywhere but a national calibration laboratory in many cases. (How many of us have a cryogenic system capable of cooling a Josephson junction array to four degrees Kelvin?)

I think there are many things we can do in our basement workshops to both check the accuracy of our equipment, and give us many happy hours of time at the bench. If you want to know whether your R-390A is hearing 1 microvolt or nothing lower than 50, you have a shot at it. If you need to know that your signal generator is giving you one half microvolt to three decimal places, you probably have a ways to go.

In the meantime, do have fun, and tell the rest of us about what you are up to.

Date: Thu, 7 Apr 2005 15:29:46 EDT
From: DJED1@aol.com
Subject: Re: [R-390] Ramblings on Calibration - was: HP 8640B

Boy, you guys put me to shame. I was going along, setting the R-390A to WWV, and thought 100 HZ was close enough. Then I got the 8660 signal generator and figured out how to measure the beat note so I could read frequency to 1 or 2 Hz.

Now you tell me that 0.1 Hz is only OK accuracy! And frequency was the one thing I was doing good on- accurate to 1 part in 10^7. On my voltmeters, I was going by the consensus method: if two of them read the same then it must be correct. The trouble was that the two that agreed were a precision power supply that I got from a garage sale for $5, and a Radio Shack digital VOM from a similar source. I finally borrowed a calibrated Fluke (0.025% accuracy on DC) from my son's shop and verified the the power supply and VOM were indeed correct to 0.1%. Also verified that my H-P 400E was still good to 1% on AC volts. Fortunately, I calibrated my scope to the power supply, so it's good.

And I used the scope to set up the URM-25, so it's good. Now if I could only get some precision caps and resistors to calibrate the rest of the VOM I'd be all set. Ed

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Date: Fri, 08 Apr 2005 09:16:52 -0400
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: Re: [R-390] Ramblings on Calibration

High level calibration for the 390a is certainly worth while. Last week I was debugging a crystal oscillator and used the 390a as the monitor. It was as stable as my crystal for several hours and the frequency was dead on. The problem with the crystal was mode hopping as the water on the gold electrode surface evaporated. I know this sounds strange, but I use the crystals as bio-sensors. This series of oscillators is to measure blood clot busting drugs such as t-PA by growing a clot on the crystal and watching the frequency shift and series
resistance change as the drug eats the clot.

Date: Thu, 12 May 2005 18:43:09 -0700 (PDT)
From: "W. Li" <wli98122@yahoo.com>
Subject: [R-390] Re: little things

Over the years, I have made some little additions to my trio of R-390A's that may be of use to you guys. Most are obvious and simple (about my speed nowadays). Most are not original with me, but have been mentioned in earlier posts through the years.

<snip> I-177 5814A accessory

Those of us with I-177 tube testers know that you can not check 9 pin miniature tubes without the MX-949U accessory. Of course, you can make up your own with all the jacks and leads...but all I wanted today was to check 5814A's, so I made up a simple plug-in for socket E using the octal male plug with its metal mounting plate scrounged from a surplus octal relay case, a Bud minibox with a standard 9-pin tube socket at the other end, and a 6-pole-two-position non-shorting wafer to switch the plate-grid-cathode leads between the two triode sections... all built out of junk-box parts in an hour. Works swell to rapidly screen through those one dollar hamfest 5814A's before I actually test them in a receiver. Parenthetically though, I think that tubes are best evaluated in a real circuit. <snip>

Date: Thu, 4 Aug 2005 13:28:25 -0500
From: Jim <jclark6@gmail.com>
Subject: [R-390] Tube Tester

I assume everyone has strong opinions about this so I will ask, what Type Tube Tester would you recommend. Make and model. I am thinking about picking up a tester and I know nothing so I will ask those who do. Thanks

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Date: Thu, 4 Aug 2005 14:48:06 -0700
From: "Tracy Fort" <beerbarrel@cox.net>
Subject: RE: [R-390] Tube Tester

TV-7....

Date: Thu, 4 Aug 2005 17:32:48 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] Tube Tester

Jim, I've owned Hickok 600a, 6000, 750 and TV-7. I got rid of the 6000 because it didn't have sockets for the older vintage tubes. I almost always use the Hickok 750 because I have more tube settings data for it than for the other two and it can put a lower plate voltage on some of the old tubes. The 600a is quite popular with users of vintage tubes and there's a lot of data for how to use it with those tubes including Western Electric tubes. I almost never use the TV-7, though I once compared mine on a number of tubes with the 600a and it indicated about the same.

Of course a tube tester is mild reassurance that a tube is ok, and can find tubes with open filaments, shorts and low emission readily. Most testers do about the same unless you get into testers with other kinds of metering, different than the ones that I am familiar with. I always wanted to try a Hickok 539 (I think that's the number?) but they seem to find buyers with more money than sense. Maybe I'll stumble across one for a reasonable price someday. Best regards, Dan.

Date: Fri, 05 Aug 2005 13:19:20 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] Tube Tester

I have an EMC 215. You can get them for $10-$25 you-know-where. Many tube nuts poo-poo them as being crass cheapo commercial units, but I have yet to find a case where it reads anything different from my TV-7 or my TV-2. The construction on the inside is not very rigorous - for instance, they use the infameous "flying joint" soldering technique in a couple of places. A few

minutes with the soldering iron will put all these right. The list of the tubes they test is quite complete. To do some of the transmitting tubes, you need an extension box which is a bit harder to find. I have only found a couple of tubes they won't test, and nobody else tests them either (like the 9556 UHF triode).

Date: Fri, 5 Aug 2005 14:43:11 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Tube Tester

The best tube tester is a working radio of course but beyond that I would stick with one of the "Mutual Conductance" type testers. (I think I got that right..) I'm using a B&K 747. The last commercially built tube tester I'm familiar with.... It's a modern tube tester if that means anything... It won't test some of the old 4 and 5 pin tubes though....

Date: Sun, 7 Aug 2005 10:32:11 +1000
From: "bernie nicholson" <vk2abn@bigpond.net.au>
Subject: [R-390] tube testers

I have been repairing instrumentation with tubes in it since the 1960 s and have always been of the opinion that the best tube tester is the circuit that the tube is in, it is easy to check the parameters of the circuit by measuring the voltage drops in the circuit i.e.. across screen resistors ,cathode/plate resistors ect ,with the mental application of Ohms law the currents are easily seen ,if no current is flowing the resistor is open circuit or the tube has no emission its as easy as that and all you need is a voltmeter, I never substitute a tube until I find a reason for problem,in my tool box I have a selection of tube extenders ,so voltages can be read easily above the chassis ,these are all home made from plugs and valve sockets, there have always been people who had pretensions to being technicians and used to endlessly swap tubes around,in Australia we used to refer to them as valve jockeys , the large government department where I trained did have a tube tester in the lab and used to sample tubes from the manufacturer to check they were in specification , when you look at the original specification for a radio like the RCA AR88 it called for full performance from the radio if ANY or ALL of the TUBES were down to 30% EMISSION ,the reality is that well engineered equipment doesn't make great demands on the tubes , Our family acquired a television set in 1956 it had 23 tubes by 1970 , most of the tubes were original , the only tubes that had been replaced were the horizontal O/P, damper diode , eht rectifier ,Ht rectifier, and a double triode in the cascade amp in the tuner, the monochrome picture tube also was at the end of its life, lots of people these days have the idea that tubes are consumable items that need replacing every so often ,i often here people talking about re tubing their rig ,,, what a consummate waste of parts and time , Regards to every one , hope this is of interest .

Date: Sun, 7 Aug 2005 02:00:00 -0600

From: "Kenneth Arthur Crips" <CRIPS01@MSN.COM>
Subject: Re: [R-390] tube testers

> have always been of the opinion that the best tube tester is the circuit that the tube is in.

This is a good point. I have a Sylvania tube tester and it works ok but there are times I wonder just how accurate it is. I found my tube pin straighter, now I am going to look for some tube extenders.

Date: Sun, 07 Aug 2005 06:27:28 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] tube testers

> circuit that the tube is in.....

That's true, and many of the tube tester manuals say so -- another YMMV disclaimer. Tube extenders are well worth having, though some are a bit too big to fit some places in R-390's. You might want to roll your own, but it's not easy to find 7 and 9-pin bases. There are various tradeoffs in tube tester design, so they may be more accurate with some types of tubes than others -- and there can be errors in the tube charts. The manufacturers did not necessarily calculate the correct minimum reading for every number. Many of the entries were probably determined through extrapolation/interpolation, if that. (Or they cheated and used a conversion factor on the values from some other tube tester.) And, of course, what's good enough in one socket in a particular piece of equipment might not be in another for the same tube number. YMMV prevails.

Tube testers do have their uses, such as:
-- Sorting through batches of old tube finds.
-- Pre-testing for shorts, grid emissions, burnt out filaments -- before installation
-- Making relative comparisons/matching or selecting tubes -- such as tubes that should not be too "hot".
-- Checking for burnt out tubes that are part of a filament string. Yeah, you could do that with an ohmmeter, moving the tube extender around from tube socket to tube socket, or pulling the chassis. In this case (like a tube Transoceanic or other series filament setup), it's a time saver.

You don't want to use a good piece of equipment to find out if a tube has a dead short that might take out a transformer. We are also learning that an NOS tube/valve is not necessarily "forever". There could be bent, shorting elements that have occurred in storage, repeated shipping around, old latent defects, etc. Long term air leakage around pins has also become more frequent, so there's something to be said for pretesting in even the simplest of emissions testers

before plugging 'em into the equipment. The reject values for mil testers such as the TV-7's seem to be set conservatively low. Good tubes generally read well over those, except for rectifiers and diodes which tend to be right on. Seems to be designed to avoid excess "tube jockying". If you pay enough for a tube tester (like too much), chances are, you'll be more inclined to use it to save tubes than to find ones to toss out. Not sure how popular "re-tubing" is on this list, but if you're going to arbitrarily replace all yours, please send the castoffs to me for
proper disposal ;-) Barry

Date: Sun, 07 Aug 2005 08:09:13 -0400
From: shoppa_r390a@trailing-edge.com (Tim Shoppa)
Subject: Re: [R-390] tube testers

I'm not gonna say it's impossible to take out a IF or RF transformer or a coil or choke due to a tube short, but most all R-390A owners are lucky enough to have B+ fuses. A while back someone was proudly stating that it's his policy to throw out every tube in each of his R-390A's every six months.

Date: Sun, 07 Aug 2005 14:18:43 -1000
From: "pete wokoun, sr." <pwokoun@hotmail.com>
Subject: Re: [R-390] tube testers

I can tell you folks how I recall we college co-ops did it back at Hickok... When the tube manufacturers introduced new tube types, 3-5 tubes were normally received along with the new design specs. Each of these new tubes was set up on a super lab tester at exactly the published specs to determine precisely how each one compared to the published specs. For example, one tube might have 104% of the rated Gm while another might have only 97% of the rated Gm.

I believe Hickok's testers usually had a fixed plate voltage but some could be set within limits. It was the bias that was adjustable with a front panel control. When one of these new tubes was set up in a particular tube tester, the bias was adjusted to approximate the plate current that was used in the manufacturers determination of Gm. When you had about the right plate curent the shunt control was adjusted so that a tube with 100% of a new tube Gm would read exactly 2/3 full scale on a fail-?-pass type of scale. The bias and shunt readings that you set up would be what appeared on the next roll chart. If the tester had calibrated Gm scales, the bias would be adjusted until the meter read exactly what the lab standard read for that tube.

Note that the tube would only have to drop to about 70% of its new tube value before it reached the bottom of the "?" area and start to be rejected. That's why a lot of tubes that test in the fail or reject part of the scale still work in equipment. Remember, tube manufacturers wanted to sell tubes and it was

better to err on the side of conservatism (better to throw away a still usable tube than to keep a bad one).

When I was doing this back in the middle 60s, there were only about 3-4 models that had their roll charts upgrated with the new tube types. There was also that cardmatic one that got the new types. If you wanted data on a tube for an older model that didn't have it on its roll chart all you had to do was call customer service. I remember dragging those oldies out of the 'morgue' and getting the settings for a customer or two. A new cardmatic model was also being develolped for the military but I don't think that ever got pass the prototype stage. I remember doing the layout on the power supply pc boards for those. By that time tubes were on their way out. Introducing new tester models was a nightmare...you had to go and verify every tube type with the new tester settings. I spent many an hour doing that on their 'mustang' model. Kind of boring but lots of overtime. enough rambling.... pete, KH6GRT

Date: Fri, 12 Aug 2005 07:46:21 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] re: test gear for your R390A

The O'Scope is a very handy tool at times. I have found the spectrum analyzer to be a most handy tool when looking for weird problems especially in crystal oscillators. Typically expensive though...they are coming down in price for older models that HP makes. They drift around a bit until warmed up much like our beloved radio's but that's OK. I just power it all up and come back in an hour and go to work. It's nice to be able to see the purity of a signal and do comparative level checks. I've found by using the spectrum analyzer I can do a better and quicker job of aligning all the crystal oscillator trimmers in the R-390/URR's I've done.Easy to see the peaks and the harmonics to make sure the right one is being peaked. Anyway it works for me.....If you end up with 5 or 6 hundred dollars that you want to spend on a nice piece of test gear for the bench take a look at one of the older used HP analyzers.....if you get one that goes down to cover the 455 KC IF you can do sweep alignments of the IF if your generator is capable...That's another subject.....

Date: Sat, 1 Oct 2005 10:16:58 -0700 (PDT)
From: Michael OBrien <mikobrien@yahoo.com>
Subject: [R-390] Hickok CA-4 data using Nolon Lee's TV-7 series data

A few years ago I had compiled data into an Excel spreadsheet using a Hickok CA-4 adapter with Nolan's spreadsheet for the TV-7 series tube tester. Nolan's data is based on the military version of the CA-5. I had contacted him at that time and he thought it was a good idea. I just recently found out Nolan had a stroke and does not remember much. I would like to post this data before it is lost (R390 site?) I do not know what complications there would be because his

data was copyrighted but posted on the web. It might also be a good idea if Nolon's data and imformation can be saved before his web site dissapears.

Date: Tue, 13 Dec 2005 20:04:19 -0500
From: "Tom Bridgers" <Tarheel6@msn.com>
Subject: Re: [R-390] Low Audio

Have you checked for leakage from the pot to ground? I have found many pots that tested okay as far as resistance goes, but what tripped me up (and caused problems in the circuit) was that the pot was shorting to the pot case (and therefore to ground) at a relatively high resistance. Some older pots are failing this way. **Heath VTVM pots are notorious for this.**

From: petesr@...
Date: Mon Oct 18, 1999 11:01 am
Subject: Re: [R-390] R-390A Test Equipment Manual References

Also NAVSHIPS 0967-187-5010 (Formerly NAVSHIPS 92134A) Instruction Book for RF Signal Generator Set, AN/URM-25D, AN/URM-25G, and AN/URM-25H; Publication 31 Dec 1953 W/Change 7 of 7 Dec 1977 (N/S 0967-187-5016)

This is the 92134A publication with the 7 changes thru 7 Dec 66 included.

>At 02:42 PM 10/17/99 -0400, you wrote:
>>I need the manual number (NAVSHIPS, T.O., etc), Title, and
>>Issue Date for the following test equipment:
>>
>>AN/URM-25D
>
>NAVSHIPS 92134(A) Instruction book for R.R. Signal Generator Set
>AN/URM-25D
>TRAD Electronics Corp
>Asbury Park, NJ
>
>contract NObsr 52725, NObsr 59494, appr. by BuShips: 31 Dec. '53
>contract NObsr 71121, NObsr 71304, change 3 appr. : 30 Sept. '58
>contract NObsr 711760, NObsr 75306 (FBM), change 4 appr. : 11 Dec.'58
>contract NObsr 75083, NObsr 75870 , change 5 appr. : 1 Sept. '59
>
>Hope this is what you need & is some help.
> I'd sure like a copy of the HSN/Dallas Lankford articles covering the

>AN/URM-25D if some one would be kind enuf to copy & send for costs.

Date: Sun, 12 Mar 2006 14:48:54 -0600
From: "Barry" <n4buq@knology.net>
Subject: [R-390] Matching info wanted

My signal generator's output impedence is 10ohms. A few years ago, I seem to recall a discussion we had about matching "networks" made up a couple resistors. Knowing the input impedence for the balanced connector is supposed to be 125 ohms, I'm running with a mismatch. Placing a 115 ohm resistor in series with the generator lets the radio "see" 125 ohms, but then the generator is seeing 240 ohms. One can place a parallel resistance across the generator so that it "sees" closer to 10 ohms, but then that throws the 125 ohm impedence off.

Is there a way to construct a matching network of sorts using a resistor network? Obviously with the generator attached to the 125-ohm input, there's no way to get the geneerator to see 10 ohms exactly, but I'm thinking there is a network that might provide a fairly decent match. Would a matching transformer be a better choice? Can one wind a decent homebrew matching transformer?

Date: Sun, 12 Mar 2006 15:15:44 -0800 (PST)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Poor mans R 389 receiver

Most of us that don't would like to have a R389, but we aren't allowed to sell the kids or persuade our wives to get 2nd and 3rd jobs. Sort of by dumb luck however I found a good equivalent on epay that set me back $200 delivered including an operators manual. My unit was a little rough so it was a bit cheaper that some of the others they had for sale. I already had a HP 312B which I hadn't got a chance to use (play with) yet so I've been lurking around epay looking for another unit. Technically it is the **HP 3586 Selective Level Meter.** This description is as underwhelming as calling the Boeing 747-SP400 a "people transportation unit." This sucker is a real sleeper. It has a USB/LSB receiver that covers 20Hz to 32Mhz. A synthesized VFO output over the same range plus it can be used as a frequency counter. As a level meter it goes down around -121dbm. That's just for starters. It measures all kind of

additional telecom stuff. Mine also came with the high stability 10Mhz oven. I checked it against WWV and it was off by 1852 Cps after being used for 15 years. Not to shabby! Because of its name and funky rf patch panel inputs almost no dealer or epay surfers know what they are good for. This of course makes it a good buy for the BA crew. Here is the icing on the cake: free operators manual written by Bill Feldmann, N6py on the BAMA site as well as the service manual is available from several sites. I got mine from the W5JGV website. These are BIG files. Volume 1 is 113Mbytes ZIPPED. It took me all night do download it on dial-up. Bill's operators manual is far superior to the HP one, which assumes that you have an EE degree from MIT. (Just Kidding). HP has kindly given permission to reprint its material. Also it looks the US military used a bunch of these. Last, but not least the unit weighs 40 something pounds and takes up almost the volume of one of are beloved receivers. No rice box here. I got mine from a company on
epay called atvm in MD which usually sells Mercedes Benz parts. [VERY well packed: UPS couldn't screw it up, a pleasant change.] They still are selling some under "receivers". Even if they sell out, this unit will show up from time to time. Download the operators manual from BAMA and see all the good stuff this thing can do. Good scrounging, Perrier

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Date: 21 Mar 2006 14:06:12 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: [R-390] HP410B rectifier tubes

Many of you own the HP410B VTVM and use them on your R39* series radios. I have one and some time ago, I noticed the AC probe stopped working. Normally, after an hour or so, the probe will become warm due to the rectifier tube's filament and mine had stopped warming up. Figuring the diode in the AC probe had died, I recently started looking for a replacement diode. As many of you also know, these tubes are becoming quite expensive. Knowing this, I decided to check everything out as the tube itself may not really be the problem.

Some of the meters use a 2-01C diode, some use an EA53, and others may have a probe where either type can be used (there are supposedly slight physical differences between the two tubes making them not completely interchangeable). Mine has an EA53 and I checked the specs for it. I noticed that the 2-01C uses a 5.0VAC filament while the EA53 runs on 6.3VAC. Checking in my manual, it states to set the filament voltage to 5.0VAC and that was what I did when I went through it a few years ago. A little reading on the internet reveals that if your meter uses an EA53, you should set the heater voltage to 6.3VAC, not 5.0VAC and some manuals may even make mention of this (mine does not).

There is a variable resistor used with a ballast tube to set the heater voltage. I set the heater voltage at the probe to 6.3VAC and reinserted the EA53. I let it warm up for about an hour and, sure enough, the probe began to warm up

again. It is again working in the AC modes; however, it reads quite low (about 30VAC where it should be seeing 120VAC). I think this is just a calibration thing and I can fix that.

I just thought I'd pass this along in case others may have experienced non-working AC probes and not realizing it may just be an incorrect heater voltage setting.

Check the diode in your probe first, though! Barry - N4BUQ

Date: Tue, 21 Mar 2006 09:25:38 -0500
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] HP410B rectifier tubes

It's also possible that a lower filament voltage makes the tube last longer and makes emission be more stable/predictable/slower-drifting. Not that I'm saying you or the internet or HP is right or wrong!

I would've expected that boosting filament voltage would've improved emission and resulted in too-high of a reading compared to your old 5VAC calibration. It is very odd for a filament to fail in a way that it "doesn't get hot" when it gets the same voltage that it always did, but that boosting the voltage gets it to some emission (but not as much as it used to). Is there any way you can measure the voltage really close to the tube, or measure the current through the filament circuit compared to spec? I'd be very suspicious of bad contacts/cables/etc.

Date: 21 Mar 2006 15:07:50 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: Re: [R-390] HP410B rectifier tubes

There may be other factors involved here, I agree. I was measuring the voltage at the tube base. I did notice that when I first checked the voltage, it was not at 5.0VAC, but had drifted downward. I don't recall the exact value, but I think it was about 4.6VAC. I don't have a very convenient way to check the current draw the filament is creating, though. I plan to go through it again, checking testpoints, tubes, and calibration. I may find other things have gone downhill since I worked on it last.

Date: Thu, 23 Mar 2006 12:27:18 -0800 (PST)
From: "W. Li" <wli98122@yahoo.com>

Subject: [R-390] re: I-177 question (OT)

I have a nice I-177 tube tester that serves me well. I recommend Nolan Lee's notes on calibration and maintenance found at

http://www.acadiacom.net/nlee/

My question pertains to the Type 83 mercury vapor rectifier. Although it was designed to operate upright, it is actually mounted on its side in this particular tester. Clearly therefore, some care is needed in use by letting it warm up for 10-15 minutes to prevent internal flashover.

My question is about converting this to a solid state device.

Replacement 83's are not exactly easy to find.... Inspecting the schematic, the HV takeoff is from the mid-point of the 5V filament winding. So is there an issue by removing the tube, and inserting two silicon 3A silicon rectifiers between this point and the plate pins 2 and 3? I would leave pins 1 and 4 unconnected to anything.

The other question is in regards to the 5Y3GT rectifier. Why does Nolan not recommend a solid state conversion here? It *looks* like the same sort of circuitry here. Obviously, 5Y3's are a lot more plentiful than 83's which makes that conversion less pressing.

To my thinking, one advantage of converting both rectifier tubes to solid state could be insuring balance in both arms of the HV windings. The others are immediate startup, and significant decrease in heat and energy consumed.

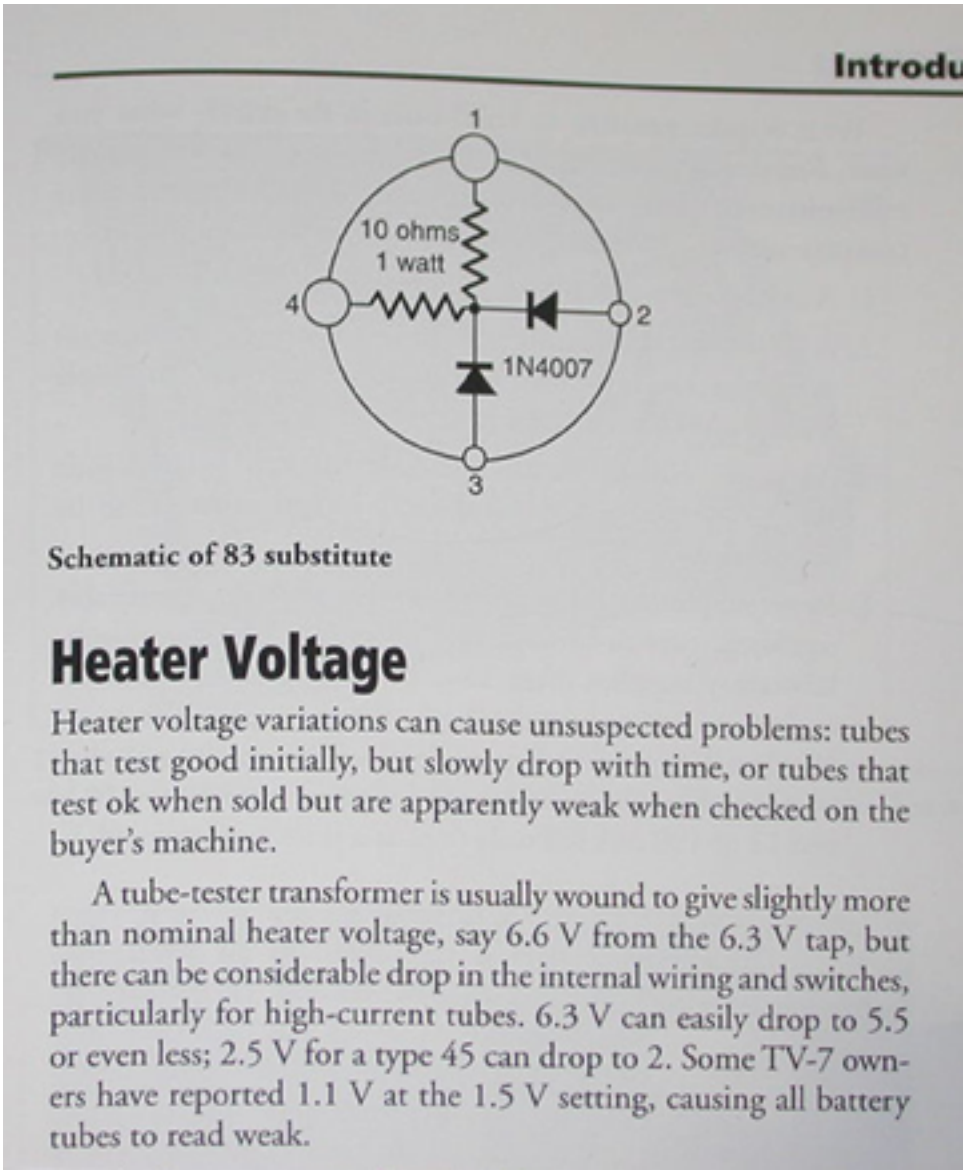
Am I missing something in this line of thinking? Philosophically, I am more interested in preserving functionality of my gear rather than preserving *history*.

Date: Thu, 23 Mar 2006 17:40:54 -0800
From: "Dan Merz" <mdmerz@verizon.net>
Subject: RE: [R-390] re: I-177 question (OT)

Hi, there was a substition of ss diodes published in Antique Radio Classified by Alan Douglas for Hickok testers, subbing for the 83. As I recall a resistor in series with each diode was involved and it was put into a tube base to be plugged in as a replacement. I'll try to find the article; the index for the 20 years or so issues that I have is not good. Douglas was quite familiar with the testers and I'm sure the sub worked just as well as the 83. Dan.

Date: Thu, 23 Mar 2006 22:17:49 -0800
From: "Dan Merz" <mdmerz@verizon.net>
Subject: RE: [R-390] re: I-177 question (OT)

Hi, the substitute for 83 type tube described by Douglas for use in a number of Hickok tube testers used two 1N4007 diodes and two 10 ohm/1 watt resistors. Connect the proper end of one diode to pin 2 and the proper end of the other diode to pin 3, and join the other two ends of the diodes. Connect the joined ends of the diodes to pins 1 and 4 via a 10 ohm resistor to each of the pins, all mounted in an old tube base. He claimed this worked exactly like the 83 in the number of Hickok testers he had tried. The two 10 ohm resistors are in series across pins 1 and 4 (the filament pins) and their midpoint goes to the joined ends of the two diodes. Without looking at a tube tester schematic, I'm not sure exactly why the two resistors are wired this way but it works. I think I tried the wiring in one of my testers but reverted to the 83 when I found one. If the hookup isn't clear from my description, I can scan a diagram he included to clarify. Dan.



Schematic of 83 substitute

Heater Voltage

Heater voltage variations can cause unsuspected problems: tubes that test good initially, but slowly drop with time, or tubes that test ok when sold but are apparently weak when checked on the buyer's machine.

A tube-tester transformer is usually wound to give slightly more than nominal heater voltage, say 6.6 V from the 6.3 V tap, but there can be considerable drop in the internal wiring and switches, particularly for high-current tubes. 6.3 V can easily drop to 5.5 or even less; 2.5 V for a type 45 can drop to 2. Some TV-7 owners have reported 1.1 V at the 1.5 V setting, causing all battery tubes to read weak.

the discussion

Replacing the 83 with Silicon Diodes

Replacing the 83 mercury-vapor rectifier in a Hickok with a pair of silicon diodes saves 15 watts of power-transformer drain, allowing more for higher-power tubes without lighting the fuse lamp. A pair of 1N4007 diodes can be wired from pins 2 and 3 of the 83 socket, to the transformer center tap. Or the diodes can go into an old 4-pin tube base as a plug-in adapter, if a pair of 10-ohm 1-watt resistors is added as an artificial center tap.

It is not necessary or advisable to replace the 5Y3 with silicon diodes. The diodes have much less voltage drop, which would require adding extra resistance in series, and the "line test" function assumes a certain constant power drain to work properly.

From: "Francesco Sartorello" <francesco.sartorello@virgilio.it>
Subject: Re: [R-390] re: I-177 question (OT)
Date: Fri, 24 Mar 2006 21:27:13 +0100

It is the artificial center tap: if you don't wanto to modify the wiring underneath the 83 socket, get an old 4-pin base and wire it in accordance with the diagram, replace the 83 with it and forget about the mercury-vapor rectifiers. I have three TV7s with this device installed years ago and the power transformer runs much cooler. Have a look at the text in the first pic. Ciao, Francesco

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Date: Sun, 26 Mar 2006 16:02:26 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] HP410B rectifier tubes

I had a chance to do a little more testing. It seems the diode is only pulling about 11 microamps (depending on the accuracy of my meter) which is not correct (should be 500 microamps). I'm seeing approximately 6.3VAC at the socket and the tube itself has slight resistance across its filament so I must have something else going on. Looks like another "project".

Date: Sun, 26 Mar 2006 16:20:25 -0500
From: "Mort Denison" <bmg50pa@suscom.net>
Subject: [R-390] Central Electronics Model B Signal Slicer w/R-390A

Has anyone ever connected up one of these to an R-390A? I've got the one with the built in Q multiplier and am curious if it's possible to hook it up without having to modify the receiver too much. Or would it not be worth the trouble?

Date: Sun, 26 Mar 2006 21:42:33 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] HP410B rectifier tubes

Did some more digging. With the cover off, I can measure the filament voltage for the EA53 while it is in circuit. I had to crank the resistor quite a bit farther "up" to get 6.3VAC across the filament. This did cause the probe to get really warm like it used to; however, the probe still doesn't check AC properly (low reading). I did some checking in the manual. It states to check the resistance "below" the ballast tube with the ballast tube removed from the circuit. This should produce 4 to 6 ohms. If it doesn't, most likely something has been "shorted" (I assume it means something has damaged the rectifier). Mine checks a little over 2 ohms, regardless of the setting of the variable resistor. Looks like I probably do have a damaged EA53. I checked the rest of the wiring and some of the test point voltages and nothing was particularly too badly awry. Looks like I'm back to looking for an EA53 :-(

Date: Sun, 26 Mar 2006 21:46:48 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] HP410B rectifier tubes

Oops. Make that 300mA heater current; not 500uA. I was looking at the wrong part of the specification.

Date: Sun, 26 Mar 2006 23:47:34 -0500
From: wabate <wabate@verizon.net>
Subject: Re: [R-390] HP410B rectifier tubes

You sure you don't want a 2-O1C? That's what I have in my 410B. You can use the EA53 but it requires a different plate contact and attaching spring. Also the filament voltage is different. Don't know if HP made a design change or if they just allowed for a different repair part. I have an NOS HP replacement part, 2-O1C. Let me know if you are interested.

Date: Mon, 27 Mar 2006 00:09:14 -0500
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] re: I-177 question (OT)

>Hi, the substitute for 83 type tube described by.....

The information I have read on this modification states that the tester's calibration would be affected and would need readjustment. IIRC, the calibration standard is a selected 6L6 supplied by Hickok.

Date: 27 Mar 2006 12:49:35 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: Re: [R-390] HP410B rectifier tubes

It has an EA53 in it. I glanced at my other meter's (ME-26) 2-01C and it didn't appear at first glance that the 2-01C would fit in my HP-410B's probe, but I'll give it a second look. Maybe someone put an EA53 in this probe and I'm just assuming a 2-01C won't fit. It sure would be great if it does as the 2-01C is generally a less-expensive tube these days.

Date: Mon, 27 Mar 2006 10:25:25 -0800
From: "Dan Merz" <mdmerz@verizon.net>
Subject: RE: [R-390] re: I-177 question (OT)

Hi, I wonder if the same information recommends calibration of the tester when the 83 is replaced with another 83? I no longer have the one I-177 that I once had, but I have Hickok 600, 750 , and TV-7 testers. If I can find the ss diode sub I made up, I'll check my three testers with an 83/ss diode substition and an ordinary 6L6 to see if there's much difference when the switch is made. My 750 shows calibration sticker in 1977 by an airport agency. I don't think I've ever calibrated a tube tester and don't consider it very important in the overall scheme of things. The challenge of finding a reference tube for calibration is more than I want to undertake unless someone has one to pass around along with the "certified" values.

Douglas provided the steps to calibrate a Hickok tester using a current source between the plate/cathode pins with the tester set for a 6L6 tube and providing 5 mA current in the plate circuit. The only way to tweak the tester was to shift the position of a magnetic shunt plate on the meter to change it's sensitivity. But aside from tweaking the meter, his test gave an indication of how well your tester indicated the benchmark reading.

Replacement of bad resistors is the next remedy if the meter is way off. All this stuff is discussed on Padgett's Hickok page, which I just casually checked to see if it mentioned calibration. In reality, 83 tubes seem to last a long time (I think I've replaced one in 15 years) so I consider the ss diode replacement an emergency measure until an 83 can be found. Maybe I can find the ss sub and provide a little more info, best regards, Dan.

Date: Mon, 27 Mar 2006 20:06:37 -0500
From: "Steve Hobensack" <stevehobensack@hotmail.com>
Subject: [R-390] Re: HP410B rectifier tubes

I had a similar problem with my ME-26D/U (a 410B clone) AC probe. The measured voltage was way off. It was a shorted capacitor just after the needle and in front of the 2-01c diode tube. A replacement cap can be fashioned from a disc ceramic cap and a dremmel tool. If you need that special cap, dremmel off the coating on a suitable capacitor plus the leads until you end up with a pill shaped ceramic cap. It was tricky to install. The cap is easily ruined by trying to measure over 300 vac.

Date: Wed, 3 May 2006 00:10:17 -0400 (EDT)
From: John Lawson <jpl15@panix.com>
Subject: Re: [R-390] More C709 info

One of my very-frequently-used bench instruments is a little (old:50s) Cornell Dubilier capacitor bridge - with a tuning eye indicator. Checks from a few 10s of pF to about 100 mF - you know the general type. It was on the "FREE" pile at a swapmeet some years back, and it cried out to me, so I rescued it. I have several much newer, more 'sophisticated' devices to do this - but for vintage

tube gear - the little CD bridge does an easy, perfect job every time - and puts enough voltage accross a cap to "wake it up"... ;} So my oblique answer to your Question above is: "Ellifino, whyncha checkit an see?" And to do that - there are a lot of older, cheaper capacitance bridges and meters out there - I get so much use out of mine it's amazing. Can't bitch over the 'price', either... Just another 200 millidollar for a Tuesday evening...

Date: Wed, 03 May 2006 07:43:37 -0600
From: DW Holtman <future212@comcast.net>
Subject: Re: [R-390] More C709 info

If you are thinking about using sand state, AADE makes an excellent cap/inductor checker. It is relatively inexpensive and very precise, very reliable. I use mine all of the time for around 3 years, with no problems. For testing cap breakdown I use a Military AN/PSM-2-A. It is a Megohm meter (meger). It has a crank handle with two leads. Hook up the cap in question and crank, it shows the resistance or breakdown of the cap. Paper Caps such as Black beauties, commonly show resistance of under 1 mega ohm, which is clearly showing breakdown inside the cap. New plastic caps such as orange drops show in excess of 150 mega ohms, mica's show infinity.

Cranking the handle around 1 turn a sec, produces the max out, which is around 500 Volts, which is good for many caps. Slowing down the cranking speed, reduces the voltage, it is easy to crank out 200 or 300 volts for lower voltage caps. One caution, have a wire with allagator clips on the ends to short out the cap after testing, a good cap will hold it's charge real well, as I have experienced this.

It can also be used for testing primary transformer windings before applying power, coax cables etc. They are available on ebay now and them. I bought mine for $10.00 and glad that I did.

Date: Sat, 20 May 2006 15:26:11 -0500
From: "Barry" <n4buq@knology.net>
Subject: [R-390] Capacitor Analyzers

I've read of the Sprague TO-5's mentioned here. Is there a preference for the TO-5 vs. the TO-6?

Date: Sat, 20 May 2006 16:37:10 -0400
From: Larry Kirkland <lkirkland@sc.rr.com>
Subject: Re: [R-390] Capacitor Analyzers

I'm still using a TO-4! I have an extra one gathering dust if anyone's interested.

Date: Sat, 20 May 2006 13:48:43 -0700
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>
Subject: Re: [R-390] Capacitor Analyzers

The TO-5 will measure turns-ratios and impedance ratios for transformers, while the TO-6 does not. I prefer the TO-5.

Date: Sat, 20 May 2006 17:09:16 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Capacitor Analyzers

Do either test the caps at rated voltage? I'm not familiar with them....I'm using a Sencore LC-73.

Date: Sat, 20 May 2006 17:15:28 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Capacitor Analyzers

Well I got the model wrong...it's an LC-102 The model I was thinking of that I had in the past was the LC-53 which is cheaper and works great. Several on the auction site.

Date: Sat, 20 May 2006 17:07:24 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: RE: [R-390] Capacitor Analyzers

The TO-6A will test the caps at rated voltage.

Date: Sat, 27 May 2006 21:36:27 -0400
From: Scott Bauer <odyslim@comcast.net>
Subject: [R-390] off topic, sorry

I am sorry for the off topic post. I have lost all of my email addresses. I was told there is a gentleman in Frederick, MD that does wonderful work on tube testers. Mine needs some attention but my hands are too shaky so solder in those tight spaces. Does anybody know who he may be? Sorry for the bandwidth. Scott

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Date: Sat, 27 May 2006 21:42:19 -0400
From: Ron Hunsicker <ronhunsi@ptd.net>

Subject: [R-390] Tube Tester Guy

I have an e-mail from 2001 from Bill Waters at <wate@erols.com>
Also an address: 5016 Mt Zion Street, Frederick, MD: 21703-5932

Date: Fri, 15 Sep 2006 14:42:06 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] IF Deck Revisited (Revisited)

For anyone who is having trouble finding 410B or 410C probe points, they are readily available if you look for steel phonograph needles. You might try restoration resources for old radios, etc. There are a number of sellers on eBay. I found a package of them at a flea market.

Date: Fri, 20 Oct 2006 14:21:57 -0400
From: K3DX <K3DXlab@comcast.net>
Subject: [R-390] Tube Tester I-177B

I've just acquired a Dynamic Mutual Conductance tube tester I-177B, with the socket adapter kit MX949A/U. Before I power up this puppy, and risk letting all the smoke out, are there any precautions I should take? The line cord has been replaced with a 3-prong version. The cord insulation looks good. I'll open it tonight and look for leaking/cracked caps and cracked resistors. The circuit is fairly simple, isn't it? Does it even use DC? I'm impressed by the meter. It has three scales in microMhos. That seems a lot better than good/OK/bad. From what I see in the charts, almost all the R390A tubes require using the adapter "octopus." The charts are dated 1952, as is the socket adapter kit.

Date: Fri, 20 Oct 2006 14:12:32 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Tube Tester I-177B

http://www.acadiacom.net/nlee/ Here ya' go Bubba!!

Date: Fri, 20 Oct 2006 18:02:31 -0500
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] Tube Tester I-177B

I have one too. Had to look for about 3 years to find the mini tube adapter module. The charts done by Nolan are first class.

Date: Tue, 31 Oct 2006 19:42:11 -0500
From: David Drew <k3dxlab@comcast.net>

Subject: [R-390] Re: I-177B Tube Tester

Many thanks for all the advice I received about this instrument. Other than some test leads in need of replacement, it is in remarkably good shape. Nolan Lee's tube chart in Excel is *awesome*. He is now my favorite redneck. Nolan, you are THE MAN! If there were an Academy Award for Best Supporting Role in Boatanchor Maintenance, Nolan would surely win a "Tubie."

Date: Wed, 24 Jan 2007 21:42:06 -0500 (EST)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: [R-390] OT: HP 8656A and HP 5328 timebase waveforms

I'm repairing a non-working HP 8656A (for aligning my R-390's), starting with the time base output. The back panel time base output on both units are not clean sine waves. Should they be perfect sine waves? In fact, they are quite dirty, although they do have a frequency of 50MHz.

Date: 15 Mar 2007 18:53:17 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: [R-390] General Radio Sweep Generator - 1025A

Anyone familiar with the General Radio 1025A Sweep Generator? I found one today in good condition but not sure if I really want/need it. It sure is a handsome thing and weighs about as much as an R390A so it has a built-in cool factor but not sure if I'd know how to fix it if it didn't work correctly. It hasn't been powered up by the current owner but he said the fellow he bought it from said it worked.

Date: Thu, 15 Mar 2007 15:14:17 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] General Radio Sweep Generator - 1025A

I sent Barry some impressions that are, summarized: It's a GREAT instrument, not easy to use, but very capable, and of course it IS a General Radio thing.. which makes me love it no matter what. I know of only a very few folks who have them.

Date: Thu, 15 Mar 2007 18:16:11 -0400
From: Mark Huss <mhuss1@bellatlantic.net>
Subject: Re: [R-390] General Radio Sweep Generator - 1025A

Not acquainted with it. The only thing on an R-390 that will benefit from a sweep generator is the R-390 (NOT R-390A) IF Deck. If it will sweep 445 to 465 kc, it will turn a two to three hour job into a ten minute one.

Date: 29 Mar 2007 14:04:38 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: [R-390] I probably shouldn't admit this but...

About a year or so ago, I noticed the probe for my HP410B stopped heating and I was getting no AC readings. After checking, I discovered the probe has an EA53 (a 6.3VAC filament diode) instead of a 2-01C (a 5VAC filament diode) and the heater voltage had been set to 5VAC. I increased the filament voltage to 6.3VAC and the probed started heating again; however, it appeared that my AC voltage readings were off considerably. Figuring the EA53 was failing, I shelved it waiting to find either a 2-01C probe or an affordable EA53. I recently noticed an auction for a probe set for the 410B but it appeared to have the AC probe from an ME26D/U. I emailed the owner and asked if he happened to have any EA53s and he did; however, he said it sounded like something else was wrong with the meter instead of the diode.

I started checking around on it again. I opened the probe top and fed the AC input via a regular silicon diode. At 60cps, the results were exactly the same as the EA53. With the probe still open and the diode powered, I checked whether the EA53 was working and I confirmed with my scope that it was functioning as a half-wave rectifier. It appeared something further upstream from the probe might be wrong. I then happened to think of something. My test voltages were coming from a variac which was being fed with an isolation transformer. Since I know that when measuring line voltages it is not proper to connect the ground but only use the probe tip, I was using that method to get sample voltages form the variac. It then occured to me that I was checking the voltages across an isolated circuit. I connected the ground clip and the meter again start reading correctly (or nearly so). After running through the calibration steps, the meter now is quite accurate on AC.

Somethimes I feel like the scarecrow from the Wizard of Oz...

Date: Mon, 02 Apr 2007 14:33:49 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: [R-390] Tube Tester Repair

A request for Tek Scope repair on the Collins list ("need servicing") prompted me to call Bill Waters. He is repairing any and all tube testers in Frederick MD. It appears that he may be the only one doing this work now.

For further information, email to him:
William Waters <ts6550@yahoo.com>

(He prefers to do business via email: a web site is in preparation.)

He will send his description of services and you can figure out what you want to do.

Date: Mon, 2 Apr 2007 14:46:53 -0400 (EDT)
From: John Lawson <jpl15@panix.com>
Subject: Re: [R-390] Tube Tester Repair

Nearer the West Coast, I've have had excellent service and dealings with Roger Kennedy at : www.alltubetesters.com He does complete repair, restoration, and refurbishment of Hikock, Cardmatics, Military, Weston, Sencore, Triplett, etc etc - and can arrange to have meters repaired and re-faced. BTW, I have no affiliation other than Happy Customer...

Date: Fri, 20 Apr 2007 19:29:26 +0000
From: "Gene Dathe" <dathegene@hotmail.com>
Subject: [R-390] Capacitor checkers

THANK YOU to all who replied to my post wtb if deck. Many offers, deck is on the way. I am currently building up my supply of test equipment and am wondering what you gents use to check caps. Would a Heath IT-11 work well for vintage BA? I think I have a C551 problem...

Date: Fri, 20 Apr 2007 12:52:42 -0700
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>
Subject: Re: [R-390] Capacitor checkers

Yes. (Heath IT-11). I use a restored/rebuilt Heathkit C-3 which is quite ancient, but does the job. However, there are better (in the sense of more capable) instruments available. The Sprague TelOhmMike TO-4, 5, and 6's are excellent, and there are others like them. I think the TO-5 will also check transformers, but the TO-6 doesn't. AFAIK, the all the TO instruments will reform electrolytics.

Date: Fri, 20 Apr 2007 16:11:58 -0500
From: "Patrick" <brookbank@triad.rr.com>
Subject: Re: [R-390] Capacitor checkers

In regards to the Sprague TelOhmMike TO-4, does anyone have a operational manual for it? I would like to aquire one, original, copy, hard copy or softcopy does no matter. Any help would be appreciated. Pat

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Date: 20 Apr 2007 20:20:27 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: Re: [R-390] Capacitor checkers

If it turns out you do have problems with C551, you might want to look at some pictures of one way I solved the problem.
http://www.knology.net/~thelanding/R390A/AGC/

It looks kind of funny, but if you don't like cutting into oil-filled caps, etc., this works and doesn't require any hacking to the IF deck. Also, you allows you to experiment with different capacitors for the SLOW AGC setting. Probably not the big selling point here, but it's a possibility. I have another alternative I'm working that won't look quite so hokey but haven't scheduled time to go to the machine shop for it. It, too, won't require any hacking to the deck and it will look a bit more like a "real" component.

Date: Fri, 20 Apr 2007 20:54:32 -0500
From: "Don Reaves" <don@reatek.com>
Subject: RE: [R-390] Capacitor checkers

I can offer you a pdf of the TO-4 manual, about 1.6MB. I can email it direct to you, or post it somewhere if your email would reject that size. No attachments permitted here on the list.

Date: Sun, 3 Jun 2007 11:30:47 -0700 (PDT)
From: "W. Li" <wli98122@yahoo.com>
Subject: [R-390] re: tube test extenders tip

Here is a handy hint re tube extenders. Some of them are faulty, in that an internal wire has opened. This is easy to spot, if you confirm continuity between each pin, its test point, and its socket for EACH and EVERY pin prior to putting them into service. We all know that they can be a convenient aid in checking operating tube pin voltages; but what none of us need is a unrecognized faulty test tube extender.

I ran into this problem, as I found out by rendering an operative R-390A inoperative by inserting a tube extender. Took me a while to tumble to the fact, that it was the extender and not me that was at fault. Dumb me!

One thing: it pays to deOxit all the pins when you get them. They are often crudded up.

One principle that I have learned through the years, is to continuously go thru and double-check my test equipment. It is a bit like preflight checks: 99% boredom, and 1% panic at discovering a fault. As an example: I use a T-BNC connector on my URM-25F, and monitor its frequency with a modern counter.

This advice may seem elementary, but sadly, it is the simple obvious stuff that often gets us!! W. Li

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Date: Mon, 25 Jun 2007 14:18:09 -0400
From: Roger Gibboni <rgibboni@lmdulye.com>
Subject: [R-390] Tube testers

Does anyone have an opinion on a TV-7 versus a TV-2 tube tester? I need one-

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Date: Mon, 25 Jun 2007 14:20:56 -0400
From: "Tracy Fort" <beerbarrel@cox.net>
Subject: RE: [R-390] Tube testers

I had both. The TV-7 is quicker for sure but I liked the TV-2 because it is much easier to work on and is not to hard to set up when you get used to it.

Date: Mon, 25 Jun 2007 14:38:11 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Tube esters

I like my TV-10D, but you will have a tough time finding one, they are rare.

Date: Mon, 25 Jun 2007 18:14:40 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Tube testers

Both will tell you approximately how good the tube is. Neither one is going to be 100% for telling you if the tube will work in a R-390 or not. I would get which ever one looks to be in better shape.

Date: Mon, 25 Jun 2007 19:36:18 -0400
From: Scott Bauer <odyslim@comcast.net>
Subject: Re: [R-390] Tube testers

From a maintenance point of view, I was told by Bill Waters " The Hickok Doc" that he wont even work on a TV-2. I do not know why. I'm just quoting him.

Date: Mon, 25 Jun 2007 18:05:26 -0700
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>
Subject: Re: [R-390] Tube testers - TV-2

> .....he won't even work on a TV-2.....

I can think of several reasons:

1) the early models had quite annoying problems with parasitic oscillations. In my case, those tend to kill A) the 83 rectifier, then B) the 6X4s, and C) any VR tubes you attempt to test. Later models had oodles of ferrite beads hung on practically every lead in them in an attempt to cure this problem. Furthermore, you can't really retrofit the ferrite beads since there are so darned many wires in there it would be easy to lose track.

2) The power transformers tend to get intermittant shorts and/or opens in them. Replacing the power transformer is NOT for the faint of heart.

3) They are AWFULLY darned big!

I have two TV-2s, an early and a later. The early one has destroyed at least two sets of rectifier tubes, and I won't use it to test VR tubes any more. I watch it like a hawk when I do use it. The later one has a transformer fault and, so far, I have not had the courage to attempt to fix the thing. I was asked once to trade an R-390 for one of my TV-2s, but since I could never get the later model one to work, I just gave up on the trade.

Date: Mon, 25 Jun 2007 21:25:03 -0400
From: "Tracy Fort" <beerbarrel@cox.net>
Subject: RE: [R-390] Tube testers

Hmmm, I would say that it would be his loss. Mine works great, Of course, mine is the later c/u model. I found it very easy to work on. So easy in fact that I wonder why someone would actually pay someone to repair one. Tube testers in general seem to be a walk in the park to repair compared to a 390.

Date: Mon, 25 Jun 2007 23:52:57 -0400
From: Scott Bauer <odyslim@comcast.net>
Subject: Re: [R-390] Tube testers

Yes, tube testers are a walk in the park. The problem is when one needs a part, it is usually the person that works on them. So why not let him do it. I spend way too much time working on my collection of R-390xx as it is. Oh, BTW Roger, I have a TV-7/DU. I am very happy with it as it has never failed me. It is a little tight inside. I had to change a tube socket and it was tough. I was told by Chris Haedt (another tester guru)(SK) a few years ago to try and find one of three testers. A Heath TT1A, A triplett 3444A or a B&K 747B. The reason is the newer mutual conductance circuit design. Heath and WEston are practically the same tester. They are both owned by Daystrom so you could also look for a Weston 981.

Date: Mon, 25 Jun 2007 21:15:53 -0700
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>
Subject: Re: [R-390] Tube testers

Interesting: I have a Triplett 3444 (not the "A" model) which is a darned good machine. However, at the moment I have nothing which shows me how and where to adjust the various voltages. The selenium rectifiers in it are getting very leaky and I want to change them before they take out a transformer.

Date: Tue, 26 Jun 2007 01:07:27 -0400
From: "Tracy Fort" <beerbarrel@cox.net>
Subject: RE: [R-390] Tube testers

I hear ya Scott. I had a TV-7b/u. It has issues and my tv-2 did not. I find the older that I get the harder it is to deal with stuff in tight areas. I sold it on Ebay and kept my others. I have a BK 650 and use it quite often. It is super easy to set up and test a tube. I also have the optional adapterwith it that allows you to test older tubes. All things considered, all of the TV testers are good. I think that it comes down to personal preference.

Date: Tue, 26 Jun 2007 07:04:30 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Tube testers

The whole issue of having a full set of tech manuals for both maintenance and full blown rebuild is a big issue on the commercial stuff. Some companies

published that kind of stuff and a lot didn't. Even the military was not quite as good as they should have been on some test gear. The compelling argument in favor of the military testers is that you are more likely to find both the data and the parts to keep them running.

Date: Tue, 26 Jun 2007 22:38:37 +1000
From: "Bernard nicholson " <vk2abn@bigpond.net.au>
Subject: [R-390] Tube testers

Guys; tube testers are for wimps the best tube tester is the circuit that the tube is working in , you can check the voltage drops across plate&screen& cathode resistors and with a modicum of mental arithmetic [remember that?] you can easily see what is happening in a circuit, in a well designed radio tubes don't work very hard at all ! The original signal Corps Specs for the RCA AR88 calls for the set to perform to its specification with ANY or ALL tubes at 30% emission This is the reality ! this is the reason that tubes are rejected on the tester but the set is still working OK, I was trained in communications in Carrier Telephony , we used to keep detailed maintenance logs of every piece of equipment And performance checks were done regularly this gear used literally thousands of tubes and many tubes were only changed after many years when the specs were no longer achieved, Back in these times people who resorted to tube testers were called Valve or Tube Jockeys, They were looked down upon and were figures of fun . Tube testers were used in Australia as a marketing tool , you could take all the tubes from your radio or TV and test them in the shop where they could sell you some more, Very convenient ! Surely if we have Pretensions to own and Maintain an Esoteric R390A one can learn about mutual
conductance and amplification factor etc. then all you need is a voltmeter.
Regards to everyone and keep the posts coming .

Date: Tue, 26 Jun 2007 11:13:41 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Tube testers

I wonder if the (RCA-designed?) RBB and RBC receivers had the same kind of specification and performance. They use the octal 6SK7 and 6AB7 tubes (or the military equivalents VT-117 and VT-176 respectively). Bernie's experience with telephony equipment may have involved Western Electric tubes. These are legendary for long life and satisfactory service with low electrode voltages, especially filament voltage. A very special application was in telephone repeater amplifiers that were enclosed in undersea cables and put on the bottom of the Atlantic Ocean (and other oceans, no doubt), and expected to work for a *very* long time. I want to run my RAL and RAK TRF receivers with WE tubes, but have not yet found a more affordable source for the WE type 336A, the 10 volt filament equivalent of the type 41. (AES sells them for about $20 each.)

Date: Tue, 26 Jun 2007 11:36:14 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Tube testers

I dunno Bernie ... as with anything, there are other considerations: those manuals were written when the gear was new and assumed it was within a few years old. There are words in most of the old manuals that are there to avoid the wasteful tendencies of some tube jockeys. Some of it was there to save the taxpayer's money. At that time, if you opened the box on a new tube, it was a good bet the tube was good. Now, it's a mixed bag.

Also, nowadays, most of us are trying to optimize performance, not operate marginally. But there are some other considerations ...

I suppose the manly way to check a new (old stock) or used rectifier tube is by plugging it into the circuit. Before you get the voltmeter test prods out, after having pulled the chassis or module, if the filter caps sizzle and explode or the power transformer burns out, that particular tube is shorted. No problem, just try another -- after replacing the caps and/or transformer. OK, maybe it's an audio tube -- ditto for the audio transformer. IF? If it burns out one or more of the IF transformers, begin again from step 1 ... after replacing the transformers?

Yes, one consideration is that this is not 1947 or 1957 any more. Fifty-sixty years later, we're gradually learning a bit more about the long-term shelf-life of NOS tubes. They have often been shipped around repeatedly and subject to vibration and possible physical shock damage. I haven't found many -- but enough -- shorted ones which were screened out by my tube testers, to be worth a quick test. I'd rather use a tube tester to find out than an unobtanium power or audio or IF transformer. Then, even if not shorted, an NOS or used tube might be substantially weak or gassy. Who was that guy with the sig line "They don't make tubes like they used to." You can't trust tubes even if in the original box. From time to time, we come across bad batches, or might be just one bad one in a sleeve of five.

Side trip: We had the same drugstore testers here in the States. They had just a few controls and lots of sockets and a roll or flip chart. Usually mounted on top of a metal cabinet with a stock of the most popular tubes. They were very simple emissions testers. I have a couple of them -- some made by "Mercury" here. Most of the time, they were calibrated to err on the side of higher tube sales, but due to limitations, they often failed to detect defects. (They strapped a lot of pins together for the test.) They would also show bad horizontal output and high voltage rectifiers to be good when they were really bad. I don't think there are any regular testers that do these. Often they were broken down -- burned out transformer due to a careless customer. The typical customer was

so happy that the tube he thought he needed was in stock, he usually didn't complain about the inflated price, and might buy two or three additional tubes "just in case".

There was a different kind of "tube jockey" here as well -- The guys who came to the house to fix your TV set. That might have been sometime after one pulled all the tubes from a set, put them in a shoebox or paper bag and trotted them down to the electronics or drug store, and found none to be bad (due to bad horizontal output, etc.) The visiting professional tube jockey did not carry a tube tester -- he carried a tube caddy -- a special leatherette covered box with a handle on it and about 200 of the most popular tubes. It usually had the colors and logo of a tube manufacturer all over it, like RCA, GE, Sylvania, etc. He pushed the set away from the wall, but not 180 degrees, so like a magician, he had a "blind". He would continue to replace tubes until the set worked (or it didn't and the chassis had to be pulled to go to the shop -- uh-oh!) Now, if there were one bad tube, and he hit it on the third replacement try, the two or three he already replaced would stay there and part of the repair job, even though the odds were that the first two were good.. So, the bill would list the 3 or 4 tubes, plus the travel time and repair time and come to a tidy sum. In fairness, it was uneconomic to make a house call for a $3.50 tube and $5.00 service call, even when gas (petrol?) was 29 cents per gallon here.

Now that was the simplest form of tube jockey fun. There were more nefarious techniques. For example, some customers learned to keep 'em honest by insisting on having the old tubes back, so maybe they would test them later or at least to foil the situation where the tube jockey replaced good tubes to put in the boxes that he would otherwise retain (in his tube caddy) to sell as new to other customers. However, the astute tube jockey might keep known bad tubes to return to the wary customer. It might have been dicier if it were the first time any tubes were replaced, where all the originals would bear the set manufacturer's brand. But old tubes were usually covered in dust and the customer often didn't look inside the boxes.

Well, back to the subject of the value of tube testers. Try this -- many of us have accumulated large amounts of various tubes -- NOS, good used tubes, unknown used tubes. Some of these came from buys of boxes and bushels of a variety of tubes. In many cases, we don't even have the gear that the tubes plug into. But, if good, they can fetch a good price, whether NOS or used, but if they are tested. Tube testers are handy for sorting through and grading tubes for future use or sale or the trash. Also, there are some circuits which benefit from a tube with moderate output, and it's easier to pick 'n choose with a tester, than plug 'n try. Not to mention tube-matching, as with push-pull 6V6's, etc.

Probably the greatest value is in checking for shorts efficiently. You can't use an ohmmeter for that, and in-circuit testing is risky at best. In some cases, they can be used to "rejuvenate" tubes. For quick sortation and checking for shorts,

gas/grid emissions, you don't need an expensive mutual transconductance tester. In fact, there are some more recent emissions testers (B&K) that are pretty handy for checking shorts -- more elaborate "lockout" circuit for dealing with known-false indicators.

Yes, the ultimate test is in the gear, but ... there are some considerations.

However, you are correct -- both down-under and up-over, we must avoid even the appearance of wimpiness. After all, our respective national anthems include words such as "bombs bursting in air" and "you'll never take me alive, said he ..." (nasty rumor he was the first toob jockey -- kept his caddy on a pole -- way ahead of his time.

There seems to be some concern about which tube tester to buy. Just make sure it's a manly tube tester. In most cases, this can be determined by the aroma after it warms up -- a kind of English Leather smell, only funkier. More meters, the better. Painted and re-painted gray with stenciled lettering, even better. Heavy? -- better still -- you can do weight training to build up your shoulders and biceps. All those switches and levers help maintain hand strength. G'day mate ...Barry

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Date: Tue, 26 Jun 2007 11:57:30 -0500
From: "" <pulsarxp@earthlink.net>
Subject: RE: [R-390] Tube testers

I love my TV-7 tube tester and I use it all the time. Very useful to me
and I'm the Chief Operator and Chief Engineer at W0VT. Also, I stayed at a
Holiday Inn last night.

Date: Tue, 26 Jun 2007 13:10:38 -0500
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] Tube testers

I have a tube caddy that was part of a deal. It still had some of the tubes in it. Most were the American 5 types.

Date: Tue, 26 Jun 2007 14:35:44 -0400
From: Barry <n4buq@knology.net>
Subject: RE: [R-390] Tube testers

I didn't stay at a Holiday Inn last night, but I do use my Hickock 752A from time to time. Guess that make sme a wimp too...

Date: Tue, 26 Jun 2007 14:40:05 -0400
From: "Joel Richey" <richey2@mindspring.com>
Subject: [R-390] Tube testers

Many years ago when I was a young shaver my father had a radio shop and when I came home from school I looked forward to fixing radios, mostly the all American-5, kitchen radios, open filaments and once in awhile a real challenge, replacing a filter cap.

One day I got to the shop and there were 2 to be fixed the first one a Philco all the tubes were lit so I went to the big Hicock tube tester and tested all of em, they all tested good, took the rx outa the cabinet and grabbed the voltmeter and check all plate and screen voltage everything looked good, worked on that radio for 3 days, the 4th day my Pop came up to me and handed me a box with a 12BE6 and said put this in and I said I had checked all the tubes and their are all good,

I put the tube in and 45 seconds later it was playing, from that doay to this I would not use a tube tester for anything, like the gentleman said, they are for wimps, buy a book and learn how things work and take you tube tester to the land fill, the fact the military uses em should answer all your guestions. Didn't mean to ramble on, but you get the picture..

Date: Tue, 26 Jun 2007 14:51:48 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] Tube testers

I have a tube tester too and I use it for one thing. Occasionally I run across some audiophile (audiophooles) type tubes and I sell them on eBay. Everyone wants to know what they test on a tube tester. So, I test them and put the reading in the auction. For my own use, I keep a stock of spare tubes and substitute when I want to know if a tube is good or not.

Date: Tue, 26 Jun 2007 15:05:27 -0400
From: "Tracy Fort" <beerbarrel@cox.net>
Subject: RE: [R-390] Tube testers

I have a better idea. Bring all your tube testers to my house. I'll sell them on Ebay while you guys learn all about tubes from a book.

Date: Tue, 26 Jun 2007 15:19:02 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] Tube testers

>..... to me and handed me a box with a 12BE6 .....

Seeing how the 12BE6 is a heptode and in a AA5 used as both an oscillator and a mixer, not too surprising that the tester got stumped by it :-). Most likely it wasn't oscillating and the tester used a grid not for oscillation for its test! I was

recently working on SPICE models for heptodes and no tube book gives useful information for modeling. Had to do some 3-dimensional curve tracing!

Date: Tue, 26 Jun 2007 15:51:34 -0400
From: flood@Krohne.com
Subject: [R-390] And the tube tester thread goes on....

My TV-7U/D came to me as NOS. It was saved from the junk pile never having been used in an old CD bunker. My friend, the rescue man, went so far as to purchase a set of adaptors for Compactrons and Nuvistors and also some test sockets with nice terminals to easily make voltage measurements without accidentally picking up B+ on your fingers in a rats nest under the chassis. He tested "One" tube and there it sat on his shelf. I traded him a very sick National NC-500 for it and we were both happy! I use it as follows. I test a few tubes at lunch once in a while, and sometimes after the kids go to bed. After keeping some for my BA's, the audio boys get to fight over the bulk of those they find desirable. PS..... I miss the ballast tube thread..... ducking and running.....

Date: Tue, 26 Jun 2007 22:49:25 +0000
From: odyslim@comcast.net
Subject: RE: [R-390] Tube testers

Hey All, Im a wimp too! And I buy my insurance from a Gekko.

Date: Tue, 26 Jun 2007 18:31:36 -0500
From: "Rick Brashear" <rickbras@airmail.net>
Subject: RE: [R-390] Tube testers

I think most of us use tube testers from time to time, I do, and they are a good way to get a feel for what's going on in a dead or poorly operating circuit. However, if you have a "known good" tube you can substitute it is the sure fire way to know if the tube is the culprit. I have several "known good" tubes I use for that purpose only. When I was in the TV repair business many years ago that was standard practice. I don't think one should ever put all of his marbles in one sack. By being versatile we can be much more successful.

Date: Fri, 29 Jun 2007 00:44:31 -0400 (EDT)
From: <daveaust@pol.net>
Subject: RE: [R-390] Tube testers

Count me in as one of the wimps too but hell, I have a lot of fun (call me crazy) sitting around testing tubes on my mil testers while I listen to my 390s. I like the heavy testers that give me a little exercise too! The TV-2 parts supply is dwindling in terms of original meters (tv-7s too) and the TV-2 trannys as well. Replacement meters are available but not too cheap. Otherwise, you can usually get them going once you eventually find the parts. I agree with needing

an out-of circuit prelim screening for tube quality before jamming a shorted tube into the radio, etc, as well as it being nice to just sort out the "better" tubes of the bunch when slightly lower Gm tubes will still work great in these rigs.

Date: Wed, 18 Jul 2007 09:17:39 -0400
From: Roger Gibboni <rgibboni@lmdulye.com>
Subject: [R-390] TV-2 tube tester

OK- I wimped out and bought a TV-2. After a little work, it runs great. I'll tell you it's very nice to be able to optimize the 390 performance by selecting the tubes for highest transconductance. Does anyone know where to find updated tube test data for newer tubes? It would seem that with the versatility of the TV-2, you should be able to set-up test parameters for any tube that fits in a socket.

Date: Tue, 24 Jul 2007 20:11:56 -0400
From: Scott Bauer <odyslim@comcast.net>
Subject: [R-390] after all these years/ tube checker story

After all these years, I have finally found a bad tube that my TV-7 passed. I had been running this radio for quite some time, about 4 months. When I came down into my radio kingdom, this radio was running but dead quiet. It is tuned up with 4 others to the Global HF System so I knew automatically there was something wrong. The others were receiving traffic. The normal troubleshooting produced nothing. I decided to check the tubes as stated above, it has been a while. All tubes tested above specs.

Swapped the IF module, still dead. Audio module, still dead. I had already checked the cables from the multi-coupler. The ballast was good, the OA2 was good, 150 volts.

I should have checked out one specific tube before I swapped out those modules as after doing it, I remembered having this problem before.It was V401, but it failed the test on the same tester in the past. I swapped it out anyhow and bingo, problem solved. That along with a few others will make a radio deader than a door nail. I know most of you already know this. I am just passing my learning experience. I am always thrilled when I am able to solve problems without getting the iron out.

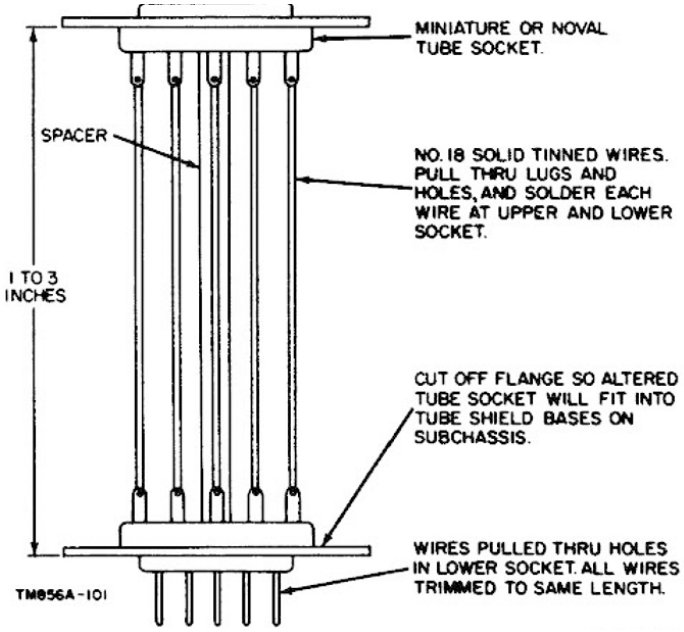
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] after all these years/ tube checker story

I have had tubes that failed the minimum test (not the shorts test) in my old TV-7 many times that worked just fine in the radio. Of course what circuit it is being used in makes a difference also. ymmv As some of the older wiser gurus have

said over the years, the best tubes tester many times is the receiver it is being used in.

Date: Fri, 10 Aug 2007 21:57:40 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Tube extenders

One of the useful items for R390A maintenance is a tube extender.Unfortunately, they rarely show up on epay and when they do they tend to get very pricey.
In compiling info for the Y3K manual I ran across a nifty adapter in the Army manual TM 11-856A as "figure 54. Fabrication of tube test point adapters."
It is both simple, clever and cheap. You use two matching 7 or 9 pin tube sockets. The bottom one is turned upside down with the #18 gauge wire threaded thorough the tube pin holes as well as being soldered to the socket tabs. The manual is available from the R390 site. If one doesn't have a copy of this I recommend you D/L it. There are several improvements to what is in the Navy Y2K version in regards to AGC circuit info as well as test jigs and two pages on the color codes used on the resistors and capacitors. Also some very nice B/W pictures of many modules. I don't have a web site but will email a TIFF image to anyone who wants it for personal use or to post it. It's also going to be added in the additional chapters of Y3K along with other test jigs from the manual.


MINIATURE OR NOVAL TUBE SOCKET.
SPACER
NO. 18 SOLID TINNED WIRES. PULL THRU LUGS AND HOLES, AND SOLDER EACH WIRE AT UPPER AND LOWER SOCKET.
1 TO 3 INCHES
CUT OFF FLANGE SO ALTERED TUBE SOCKET WILL FIT INTO TUBE SHIELD BASES ON SUBCHASSIS.
WIRES PULLED THRU HOLES IN LOWER SOCKET. ALL WIRES TRIMMED TO SAME LENGTH.
TM856A-101

Date: Sat, 11 Aug 2007 19:28:27 -0700 (PDT)
From: wli <wli98122@yahoo.com>
Subject: [R-390] re: tube extenders

Tube extenders are useful. Look in those myriad of unmarked boxes at hamfests. I found mine there for $2 apiece last year. You have to be on the lookout as they do not turn up often.... One caveat: some of them may have a busted wire INSIDE. Pays to check continuity between the pin and the test point as well as the socket hole. I had two such *defective* extenders, easily fixed with a short piece of bare wire and a little surgery on the device.

I understand that many of us never use them, they are better at diagnosis than I;.... and I need all the help I can get.....

Date: Sun, 12 Aug 2007 07:37:03 -0400
From: "Steve Hobensack" <stevehobensack@hotmail.com>
Subject: [R-390] Tube extenders

Yes, tube extenders are getting rather rare these days. I made my own. It takes a little patience but can be done by most of us. Find a miniature tube and socket. Break the evacuation tip to destroy the vacuum. Use a dremmel tool with a glass cutting wheel, or special hacksaw blade, and cut the tube near the base. Solder up short insulated leads to the socket. The hard part is cutting the glass.

Date: Sun, 12 Aug 2007 12:17:35 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] re: tube extenders

Also check to see if the pins are connected to the correct tabs. I friend of mine went crazy trying to trouble shoot a Johnson 500 until he found that one of his socket extenders had a pin connected to the wrong tab.

Date: Tue, 14 Aug 2007 21:08:45 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Tube extender revisited

>Use a dremmel tool with a glass cutting wheel, or special hacksaw blade, and cut the >tube near the base. Solder up short insulated leads to the socket.

>The hard part is cutting the glass.

I agree that this can be done and it has been proposed before. But why do it? Cutting glass with a dremel tool safely is tricky and very slow. This I've done. The tube pin material is specially designed to match the glass coefficient of expansion and the internal elements are spot welded to them. Not having done it I don't know how easy it is to solder wires to the pins. Then you still need another tube socket. With the army manual adapter all you need are two matching tube sockets and some #18 wire. All you do is wire the top socket, then thread the wires through the reversed bottom socket, solder to the tabs and trim the extending wires to size. IMHO, the army method is far faster and safer. I suspect that one could make 10 of the Army design before one could make one the other way. But this is America and one can pay ones money and can do what's a personal preference.

Date: Mon, 17 Sep 2007 14:17:34 -0400
From: Barry <n4buq@knology.net>
Subject: [R-390] OT: 30V regulator?

Not much on the list for a while so would like to ask an OT question.

I have an old Triplett 630-NA meter and would like to use the ohmmeter section. It takes a 30V battery (which is still available) and a 1.5V D cell for ohm functions. I was thinking of making a small 30V regulated powerr supply and house it inside the cabinet. This is an older, kind of rough condition meter that I keep because my father gave it to me so modifying it doesn't bother me too much.

I was thinking of a 24VAC xfmr with a full-wave bridge, a cap, and possibly a 3-terminal regulator but didn't know if a 30V 3-terminal regulator is available. Also, would like to make a 1.5V power supply for the D cell, but not sure if a 1 or 1.5 xfmr could be had as well as whether a 1.5V regulator is available.

Any thoughts? Thanks,

Date: Mon, 17 Sep 2007 14:27:48 -0400
From: Steve Byan <stevebyan@mac.com>
Subject: Re: [R-390] OT: 30V regulator?

The LM317 will handle up to 40 volts on the input, and can be configured to supply 30 volts. If the unregulated input is above 30 volts, then you'll need an LM317HV. There may be newer parts that are better, but the LM317 should work and is readily available. The 317HV might be hard to find.

> Also, would like to make a 1.5V power supply for the D cell, but not sure if a 1 >or 1.5 xfmr could be had as well as whether a 1.5V regulator is available.

The LM317 will go down to 1.5 volts.

Date: Mon, 17 Sep 2007 14:36:18 -0400
From: wabate <wabate@verizon.net>
Subject: Re: [R-390] OT: 30V regulator?

I have a Triplett as well, but a different model. The 30V battery is tough for me to get. So I installed 4 nine volt batteries in series. They last forever. The point is that you don't have to regulate the power supply, if you want to build one. It isn't that fussy. Why complicate it?

Date: Mon, 17 Sep 2007 14:44:35 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] OT: 30V regulator?

You might look here:

http://www.batteriesinaflash.com/index.php?main_page=product_info&products_id=1495

Believe it or not, Radio Shack can order the Eveready 30V battery for you and have it shipped to your house for no shipping charges. I was just trying to come up with something that doesn't use batteries. I always have that fear of them leaking, etc. I do like the 4 x 9V solution, though. I finally found the schematic and see where the 30V is only needed on the highest ohm scale so I might not even fool with it.

Date: Mon, 17 Sep 2007 14:48:10 -0400
From: Roger Gibboni <rgibboni@lmdulye.com>
Subject: RE: [R-390] OT: 30V regulator?

How about using a 28 or 30 volt wall wart from a computer?? The 9 volt batteries are a good idea- Roger WA3YTM

Date: Tue, 18 Sep 2007 09:22:16 +1200
From: kenny <igloo99nz@yahoo.co.nz>
Subject: Re: [R-390] OT: 30V regulator?

I have recently been searching for a voltage regulator for a 50-volt supply that I want to build. So far I have had no luck at all and may have to consider using transistors to help with regulation although on the circuit that I found one of the author's first comments was "the regulation is not as good as with a IC regulator" so I'm probably back to the drawing board on that one.

Someone suggested the LM317...Yes I would agree. They are cheap and easy to obtain and you can adjust the voltage. Even though the 30-volts is only used on the high-ohms range I would go ahead and build it if I were you as it would bug me if I had a piece of equipment that I couldn't get full use of (I expect many of us are like that that's part of the reason we embark on restoring our BA's). Regarding the 1.5-volt supply...I don't recall the type numbers because during my search 1.5-volts did not interest me but I did notice many regulators that can be adjusted down to this voltage.

Regarding the supply that I want to build...My wishlist is for it to be fully regulated and stable 50V and adjustable over a small range 48-51V. I don't want to buy one, I want to build one but I just cannot find a suitable regulator. Anyone have any ideas on where I can find a regulator for this voltage OR a really good transistor (Bipolar or FET) circuit?

Date: Mon, 17 Sep 2007 15:37:14 -0600
From: "DW Holtman" <tubestuff@comcast.net>
Subject: Re: [R-390] OT: 30V regulator?

Don't forget about the simplest regulator around, the good old Zener. DigiKey sells a 1 watt 50 volt zener (1N4757ADICT-ND) for $0.36 in quanties of 1. They are available in voltages from 1.8 to 200 volts. They are simple and almost fool-proof.

Date: Mon, 17 Sep 2007 16:44:51 -0500
From: "Bill Hawkins" <bill@iaxs.net>
Subject: RE: [R-390] OT: 30V regulator?

There's a lot of talk about voltage, but not about current. Both are required to pick a regulator. I've used a Triplett 630 NA for as long as I could afford a good meter. I value its portability, and would not think of tying it to a line cord.

The 30 volt source draws microamps, easily done with a zener diode. That's what the zero ohms adjustment is for. You can't do insulation resistance without it. You can build a DC/DC converter for 1.5 to 30 volts at low current with a few parts.

But how are you going to turn off the 30 volt multivibrator when it's not needed? The 1.5 volt source is another matter. It draws hundreds of milliamps on the X1 scale. Really does seem easier to change batteries than to remove the instrument's portability. Test lead resistance matters at those currents.

Please excuse this humble opinion if it conflicts with your own faulty reasoning.

Date: Mon, 17 Sep 2007 18:18:16 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] OT: 30V regulator?

The 30 volt setup in that meter is a *very* low current affair. Without a schematic I'm only guessing, but 50 ua is probably the maximum current draw. Most of the time the current draw is zero. A 9V battery and a capacitor based DC-DC converter would do a very nice job. Anything beyond that is going to pull *way* more current for the regulator than your total load. If you never want to replace the battery again, take a look at a stack of lithium coin cells. At 3 volts each, a stack of 10 will do the trick. Lithiums last pretty much forever on the shelf ...

Date: Mon, 17 Sep 2007 19:28:29 -0500 (CDT)
From: "Jim Shorney" <jshorney@inebraska.com>
Subject: Re: [R-390] OT: 30V regulator?

And here's a handy page to calculate the resistor values, for the lazy among us: **http://www.muzique.com/schem/lm317.htm**

Date: Mon, 17 Sep 2007 20:39:51 -0400
From: "Dave Maples" <dsmaples@comcast.net>
Subject: RE: [R-390] OT: 30V regulator?

All: I believe an LM723 can be used in a series-regulator fashion to regulate well above its ratings. Please see the National data sheet for details. It may require an external pass transistor.

Date: Mon, 17 Sep 2007 19:37:34 -0500 (CDT)
From: "Jim Shorney" <jshorney@inebraska.com>
Subject: Re: [R-390] OT: 30V regulator?

Again, the LM317. The 40 volt rating is for input-output *differential*. You can regulate voltages higher than 40 volts, as long as the difference between input

and output voltages does not exceed 40 volts. You can configure them with a pass transistor for higher currents, check the app notes in the PDF datasheet: http://www.national.com/mpf/LM/LM317.html

And do include the recommended protection diodes and bypass capacitors, you won't regret it.

Date: Mon, 17 Sep 2007 17:55:22 -0700 (PDT)
From: Masters Andy <nu5o@yahoo.com>
Subject: [R-390] 150 V regulator

Based on National Semiconductors website and their statement that the LM317HV operates isolated and can handle several hundred volts as long as the input/output difference is not more than 40v, could this device not be used as a very nice 150v regulator replacing the OA2?

Date: Mon, 17 Sep 2007 21:01:34 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] 150 V regulator

The OA2 is basically a shunt regulator. The "easy" way to solid state it is with a couple of zeners. If you want something more fancy a combo of a zener, a resistor and an MJE 340 will do quite well.

Date: Tue, 18 Sep 2007 00:04:24 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] OT: 30V regulator?

If you want to build your own, there is no need to go fully discrete -- use an op-amp driving a level-translating transistor and a pass transistor. You can use a resistor and zener off the unregulated B+ to develop a 24-or-so volt supply for the op-amp. Another resistor and a voltage reference of your choice (zener or fancy reference chip) will give you the reference to feed to the non-inverting input of the op-amp. The op-amp output feeds the base of a common-emitter transistor or the emitter of a common-base transistor, the collector of which goes to the unregulated B+ through a suitable resistor. The collector of that voltage-translating transistor also goes to the base of the pass transistor, which can be connected as an emitter follower (collector to B+, emitter to the load) or as a common-emitter amplifier (emitter to B+, collector to the load). A voltage divider from the regulated output (load connection) feeds the inverting input of the op-amp. A small pot in the voltage divider gives you a little adjustment range. A few resistors and clamp diodes here and there to avoid catastrophe on power-up and power-down, and you are all set.

If the supply is to produce regulated +50 volts, the voltage translating transistor will be NPN, regardless of whether it is connected common-emitter or

common-base. The pass transistor will be NPN if it is an emitter follower or PNP if it is used in a common-emitter configuration. Note that the "inverting input" and "noninverting input" of the op-amp may be reversed depending on whether the voltage translating stage and pass stage are inverting (common emitter) or non-inverting (common-base, emitter follower). I have successfully built regulators for over 1000 volts and up to 1000 mA this way. Op-amp application notes are full of circuits like these.

Date: Tue, 18 Sep 2007 00:09:24 -0400
From: Mark Huss <mhuss1@bellatlantic.net>
Subject: Re: [R-390] OT: 30V regulator?

Linear makes the LT3012, 3013, 3014 that provides up to 60 volts regulated at from 20 to 250 mA. I remember we used a linear high voltage regulator that could take up to 105 volts in, and provide up to 95 volts out. If memory serves, it was made by National Semi. Can't for the life of me remember the part number, and a look at the site does not reveal it. Could not provide much current. And it used a MOSFET pass transistor, so the voltage drop was humungous.

TubeCad Journal has a selection of high voltage power supplies (greater than 30 volts) using tubes, semiconductors, or a combination of both.

Date: Mon, 17 Sep 2007 21:53:38 -0700
From: John Kolb <jlkolb@jlkolb.cts.com>
Subject: Re: [R-390] OT: 30V regulator?

Having to plug in the meter whenever I took it somewhere besides my bench would be a real drag. You might consider putting a plastic baggie around the battery with just two small holes for the battery holder contacts, to prevent damage from leaks. Got my 30V battery at Radio Shack.

Date: Tue, 18 Sep 2007 23:51:13 +1200
From: kenny <igloo99nz@yahoo.co.nz>
Subject: [R-390] OT: 50 Volt Regulator

Thanks guys for all your ideas and input...the idea of floating the regulator had never occured to me, that's a great idea. I will be studying the application notes on the LM723 and LM317 and build up a prototype and see how it goes. The power supply I want to build is rather elaborate...it's for a linear amplifier project

that I want to pursue. It's actually three supplies in one enclosure. I need 50volts @ 50amps peak, adjustable 38 to 50volts to set the bias and 12volts for the control circuitry. No point even thinking of starting the amp project until the power supply is sorted and if I make it adjustable over the full approx 40volt range of the regulator, the supply can be used for other things as well.

Date: Tue, 18 Sep 2007 08:37:51 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] 150 V regulator

Any transient increase in load above the dropout current (even, say, a module with some capacitance in it being plugged in) would cause the regulator to go into foldback, resulting in more than 40V across the terminals, resulting in all the magic smoke coming out. With the regulator on the audio deck but all the loads scattered about the other decks, this is pushing it. If (BIG IF) you wanted to solid-state the 0A2, the right choice truly is a solid-state shunt regulator. There's no shortage of 0A2's, especially mil-spec 0A2's. It's a very nice regulator tube.

Date: Tue, 18 Sep 2007 08:57:12 -0400
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: Re: [R-390] OT: 30V regulator?

Zeners are good. For 48-52 voltsYou could use a 48 v zener and bias its 'ground' point with an adjustable regulator. For ~1.5 v I use a couple of 1N400x in series - not bang on but close (horseshoes, hand grenades and drive in movies ;-) I've built regulators with an op amp and a big pass transistor. The trick is capacitors in critical places, the transistor base and a BIG one on the output to keep it stable.

Date: Wed, 19 Sep 2007 22:46:11 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] RE 150 Volt regulator

Wrote: If (BIG IF) you wanted to solid-state the 0A2, the right choice truly is a solid-state shunt regulator. I developed a SS 0A2 shunt regulator using the TL431. (Inspiration by Dr. Jerry, who is sorely missed.) Reply off line for a PDF file of about 100K if interested.

Date: Thu, 11 Oct 2007 22:18:32 -0500

From: "Glenn Little WB4UIV" <glennmaillist@bellsouth.net> Add to Address
Subject: Re: [R-390] Re: query over North Atlantic 213C (OT)

I saw this while going through some old email. The Phase Angle Voltmeter is used in aligning servo and synchro systems. We used them in the navy to align the fire control, RADAR and ECM synchro and servos.

There may be other uses.

Date: Sat, 27 Oct 2007 21:31:51 -0400
From: "Richard Spargur" <k3ui@comcast.net>
Subject: [R-390] TV-7/U (Square peg, round hole)

Does anyone have a method for testing new tubes (does not have identified test setup and data) on a TV-7/U? I want to test tubes like the 6LQ6 Sweep Tube, but it has a nine pin arrangement which is not compatible with either a TV-7/U. There was a fellow in JA-land, radiomann (that is how he spells it), that built an adapter for testing tubes and a bit of a guide on how to develop new test data, but now it is all in Japanese. I am not literate in Japanese for me it might as well be in ancient Egyptian Hieroglyphs. Any help?

Date: Sat, 27 Oct 2007 21:42:56 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] TV-7/U (Square peg, round hole)

The adapter part is fairly easy. You pick a "close" tube and wire it up so the pins come out in the right places. More or less, cathode to cathode, filaments in the right place etc. Pretty much all testers set up the grids in a fairly predictable pattern. If you grab a TV-7 schematic and data for a couple of similar tubes, it should be fairly obvious what they are doing (hook these to the plate, those to the cathode, the rest to the control grid ....). Depending on the tester they will do things a bit differently. You depend on the fact that they are going to set up all pentodes the same way ....

Bias on the control grid is about the only major variable. Essentially you are measuring plate current with a fixed bias. You can go through a lot of math to work out what the numbers should be. The "easy" way is to plug in a known good tube and fiddle the bias switches until you get a reasonably easy to see reading ....

Date: Sun, 28 Oct 2007 06:07:43 -0500
From: "Joel Richey" <richey2@mindspring.com>
Subject: [R-390] Tube testing.

You cannot test a 6LQ6 in an tube test and get any meaningful results, the tube tester cannot simulate the working conditions of that tube and it cannot test an 811, 572B, 3-500 or any any other transimitting tube, Sweep tubes have been aeround for a long time, most of the time they loaf but when you shout int the mike the draw a big hung of current, do you think your tube tester can simulate that, "NO". Heres my idea, take your tube tester out to your trash can and desposit it. Just my opinion, if you lke to see the needle move, keep using it.

Date: Sun, 28 Oct 2007 12:36:05 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] TV-7/U (Square peg, round hole)

If you are going to do a lot of these tubes you may want to build an adapter. Octal base relays with plastic covers make nice adapters. You open the relay top and unsolder the relay wires from the octal socket pins. You solder pig tail wires to your new socket and mount it in the top plastic cover of the relay case. Feed the pig tail wires into the octal socket base pins. Replace the cover screws between the base and cover of the relay. Pull the pig tail wires out of the octal pins to look nice. Solder the pig tail wires in the octal socket pins and trim.

Bob Camp wrote a good procedure to adopt any tube to any tube tester. Many tubes were missed in many tube tester lists.

Watch the TV7 knobs as you set it up for a known tube. You see that a couple switches set the filament pins. One sets the cathode one sets the plate. And so on down the line of switch settings. The same knob has the same function on every tube.

Some other tube testers are pin to function dependent. The switch serves the same pin every time and selects, fil, cath, plate, open.

The bias selects a grid bias.

There are other setup I do not remember off the top of my head Do a bit of study and your tube tester becomes a lot more useful. Adapters can be made, switch setting divined, bias values fathomed and meter values established.

Tube testers are just another item of test equipment and new ways to apply them can be discovered all the time. Some think tube testers just make good foot

rest, poor door stops or paper weights. Others find all kinds of ways to apply the test instrument in creative ways and gain meaningful test results from the experiment of the moment.

Date: Thu, 24 Jan 2008 20:50:23 -0600
From: "Barry" <n4buq@knology.net>
Subject: [R-390] FA: GR Audio Meter

Some of you guys might be interested in an audio power meter for measuring output on the R390A, etc. I sold my TS-585, but this thing sure looks nice (it isn't mine). http://tinyurl.com/2wbknr

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Date: Thu, 24 Jan 2008 21:49:01 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] FA: GR Audio Meter

Cute little thing. Certainly worth the money if it's even close to working.

Date: Fri, 25 Jan 2008 00:26:44 -0500
From: roy.morgan@nist.gov
Subject: Re: [R-390] FA: GR Audio Meter

Would-be audio power output measurers, The GR 1840A output power meter is the fourth and last of such things GR made. It is in fact superb. Once you have one, you wonder how you got along without it till then.

It measures from 0.1 milliwatts up to 20 watts directly and can be set for any practical impedance load (0.6 ohms to 32 kilohms). It is for all practical purposes flat and plenty accurate for any uses we would have. Cute trick: get a separate load resistor, put the output power meter in parallel with that and set the meter for 10 times the load resistor. The thing will then indicate one tenth the power in the load. This gets you to 200 watts easily. Or, you can make a "T" network as the manual explains. Note, the one for auction has a bid of $15 just now, but normally they go on ebay for up to $100 or a bit more, though lately one or two have sold for more modest prices. (300193100784) There is a manual scan available at http://www.jptronics.org/radios/ for anyone who might buy it or already have one.

Date: Fri, 25 Jan 2008 18:13:53 -0500
From: "Harold Hairston" <k4hca@alltel.net>
Subject: [R-390] TEST EQUIPMENT RECOMMENDATION

I would appreciate knowing what The List Recommends in order to do a good an accurate job of electrical restoration and maintenence (Not physical restoration). My collection includes an R-390A, a dozen pieces of Collins S-Line

and some E.F Johnson. I probably have little more test equipment than what the average Ham has; good VOM, VTVM, Scope and a few pieces of HeathKit. Since I am only working on my own equipment, I don't want to move to the level of A Service Monitor, etc. Perhaps the Tube Type would be best as I could fix it if it breaks. Models and Manufacturer would be great. All recommendations graciously accepted.

Date: Fri, 25 Jan 2008 18:44:57 -0500
From: "Harold Hairston" <k4hca@alltel.net>
Subject: [R-390] Re: {Collins} TEST EQUIPMENT RECOMMENDATION

I forgot, I do have a TV-7.

Date: Fri, 25 Jan 2008 18:50:17 -0500
From: Jon Schlegel <ews265@rochester.rr.com>
Subject: Re: [R-390] TEST EQUIPMENT RECOMMENDATION

I guess the next item I'd add would be a signal generator. For general receiver work you really need a generator that's stable, RF tight and with a correctly operating attenuator. There is nothing more perturbing than setting the attenuator to max and having the receiver under test still responding to the generator signal due to the RF it is "spraying" or leaking around the attenuator. My personal favorite sig gen is the HP 8640B but it's not vacuum tube and is prone to an aging problem of nylon gear breakage. Nevertheless the 8640B is reasonably easy to work on and with patience, the broken gears are typically fixable. I know that there are other common vacuum tube generators that will fit the bill but I'm not really up to speed on what's available. Perhaps others on the list can help out there.

Date: Fri, 25 Jan 2008 19:02:05 EST
From: JRFKE5RI@aol.com
Subject: [R-390] (no subject)

Harold, if you can find an old URM-25, they are perfect for the job. In fact, that is what I used in the Navy when I repaired R390A's. Sometimes they show up on ebay or try Fair radio
http://www.fairradio.com/catalog.php?mode=search&query=URM-25

Date: Fri, 25 Jan 2008 18:16:14 -0600
From: "Bill & Becky Marvin" <wmarvin@hickorytech.net>
Subject: Re: [R-390] (no subject)

I bought mine also from Ebay and was fortunate to buy URM25G model that is refurbished.

Date: Fri, 25 Jan 2008 19:38:24 -0500
From: "Harold Hairston" <k4hca@alltel.net>
Subject: [R-390] Re: {Collins} Re: TEST EQUIPMENT RECOMMENDATION

Dern! I forgot that I have a good Frequency Counter. That's it though. Sry.

Date: Fri, 25 Jan 2008 22:36:32 EST
From: DJED1@aol.com
Subject: Re: [R-390] TEST EQUIPMENT RECOMMENDATION

It sounds like you have most of what you need. The VTVM is critical for some measurements, and the scope is useful for troubleshooting. You will need a signal generator (my Heathkit generator left a bit to be desired). The URM-25 was originally used with the R-390A, and is available at reasonable $100-200 price. If you want to take a step up in the generator, you could go to an HP 606 (tube type), which is a real boatanchor by itself. I still have my URM-25, but moved up to an HP 8660A ($300), which was the first of their solid-state synthesized signal generators. I can trust the signal levels a bit better than the URM-25, and the frequency readout is infinitely better. I also picked up an HP AC voltmeter to use in measuring the signal and noise in sensitivity measurements, and a HP frequency counter, mostly for setting PTOs. The VTVM can serve the same purpose as the AC voltmeter. I also have an inexpensive tube tester. I guess the only other test item that I'm looking for is a capacitor tester, which will then allow me to check every kind of component in the radio. Good luck in your search.

Date: Sat, 26 Jan 2008 10:20:06 -0800 (PST)
From: wli <wli98122@yahoo.com>
Subject: [R-390] test equipment recommendations

The list has provided a comprehensive listing of test equipment for you. I use a BNC T-connector off of my URM-25F, and use my frequency counter as a readout of this venerable RF generator. Should mention that a "real" VTVM is what you need at the diode load, not a cheapo digital high impedance voltmeter.

Capacitance values may be measured using simple 555 timer circuits. But for capacitor leakage measurements, you will need a variable HV supply and a VTVM. The HV supply can be also usd to rebuild an existing electrolytic, if that is your wish (another controversial subject). My homebrew variable HV supply employs a small Variac feeding the primary of a junker TV transformer

(appropiately fused and user insulated), and a simple LC filter. Parenthetically, I
was astounded at how NONE of my Orange Drops leaked, and how many of the vintage oil-filled and waxed paper caps leaked at 250VDC.

Additionally, I found that 7-pin and 9-pin tube extenders handy in measuring pin voltages when the receiver is operating.

DeOxit is a fabulous product when used judiciously on contacts. Much has been posted on how NOT to use this chemical, but I wager we all still use it frequently.

I found that a roll-around clear plastic 52 inch tower set of drawers meant for clothes is a dandy way to store spares: tubes, caps, manuals, what have you. Mine is attached to a plywood base for rigidity, and rolls around on four commercial grade 4 inch rubber wheels. All the various probes, leads etc needed for the test equipment are hung on the back of the plastic tower on large clothes hooks. Goes where you need it, and occupies a small of amount of valuable floor space. One thing I plan is a similar roll-around arrangement using a short 19 inch rack to have the test equipment all together and off the workbench.

Date: Sun, 27 Jan 2008 13:53:25 +1100
From: "Pete Williams" <jupete@bigpond.net.au>
Subject: [R-390] Sweep generator wanted.

G'day USA.... wanted is a HP 8601A sweep generator.... got some Racal needing a check over for one thing . Yep, been to the bay but never found the water cool enough.! Any lying around superflous to requirements ?

Date: Sat, 26 Jan 2008 21:11:30 -0600
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Sweep generator wanted.

I've got a dodge for you, if you've got an HP 8640B or other generator that does DC-input FM and you have or can build a linear ramp generator: run the output of the ramp generator, DC-coupled, into the FM-mod-in jack of the 8640B, set the unmodulated freq for the low end of the sweep range (for a +-going ramp starting at 0V), and then set the modulation gain pot on the 8640B so that the high end of the sweep is to or past the range you need swept.

I also use the ramp as x-axis drive on my scope, so that I see the output from the DUT as a true response curve. It works a treat, My 8640B goes down to about 450 KHz, which is good for most IFs, and up to about 1.2 GHz, which is a bit better than the 110 MHz of the 8601A. Ramp generator schematics are available on the web, though I use my sweep generator's ramp output -- which

is fudging, I admit, but it still works. Just in case you can get an 8640B and not an 8601A.

Date: Sun, 23 Mar 2008 20:53:40 -0600
From: "Sam Letzring" <sletz@msn.com>
Subject: [R-390] hp 410B VTVM (for working on my R-390A)

I was digging around in my attic above the shop/shack and came across my old HP 410B! No tube in the probe (of course). Has anyone " successfully" modified the probe to use a solid state device- or do I need to keep looking for a EA - 53???

Date: Sun, 23 Mar 2008 23:46:10 -0400
From: wabate <wabate@verizon.net>
Subject: Re: [R-390] hp 410B VTVM (for working on my R-390A)

I would not want to change to a SS diode, as tempting as that might be. A 1N66, etc. would be OK but you would loose a lot. Diodes are limited to about 20 vac and 250 MHZ but the 2-O1C can handle over 300 volts, depending on frequency. The upper frequency limit is over 700 MHZ. Hard to duplicate that with a SS diode, unless a 20 volt limit is OK for your app. The 410-B should use the 2-O1c not the EA-53, unless it has been modified. BTW, I have 2-O1C, NIB. Trade?

Date: Mon, 24 Mar 2008 03:27:59 -0400 (EDT)
From: John Lawson <jpl15@panix.com>
Subject: Re: [R-390] hp 410B VTVM (for working on my R-390A)

Sam - I have several of these NOS - write me off-list if you need one....

Date: Mon, 24 Mar 2008 07:38:03 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] hp 410B VTVM (for working on my R-390A)

I don't think that's correct. HP built the 410B for both diodes in different probe configurations.

Date: Mon, 24 Mar 2008 08:12:53 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] hp 410B VTVM (for working on my R-390A)

According to my manual instruments with serial numbers above 003-31433 use the EA53.

Date: Sun, 4 Jan 2009 11:09:31 -0600
From: "Tisha Hayes" <tisha.hayes@gmail.com>

Subject: Re: [R-390] R-390 C101 and C103 Caps

"The surge voltage on that cap will happen before the series regulators get heated up, so a quick measurement at turn-on will be needed to find out what you need. Here is where the DVM is best set aside and a VTVM with moving needle used."
-- I am a big fan of VTVM meters for high Z measurements where the loading on a circuit by a DVM really throws off a reading, for the ease in peaking a level like the diode load level by watching the swing of a needle and when measuring RF levels with a high frequency meter (some of the HP 400 family meters are great for this) are the best choice. The use of a really good DVM on peak measurement readings of B+ may actually be a better choice in some cases.

To measure very fast peak rises on a non-high-impedance circuit I still use a top end Fluke DVM with a fast capture option and with peak hold capability. I have found that the measurement accuracy of a good Fluke rivals a capture and hold oscilloscope for measuring fast transients and gives me a fast capture peak-hold capability when measuring current as well.

>From an aesteic standpoint a tube meter with a mechanical movement is what the R-390 was originally designed to work with back in the 50's and 60's. We cannot forget that there are pieces of modern test equipment that will surpass the capabilities of a good old VTVM for certain applications. --

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Date: Sun, 04 Jan 2009 13:55:39 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] R-390 C101 and C103 Caps

>I am a big fan of VTVM meters for high Z measurements where the
>loading on a circuit by a DVM really throws off a reading

I hesitate to say "all" without checking, but I believe all of my DVMs have 10 or 11 Megohm inputs (VTVMs are generally 10 Megohms). I know the ones I use regularly do.

> From an aesthetic standpoint a tube meter with a mechanical
> movement is what the R-390 was originally designed to work with
> back in the 50's and 60's.

I'm not sure the radios were really "designed to work with" d'Arsonval VTVMs, so much as those were what was available at the time. Don't forget, there were also non-buffered VOMs in use, too. Indeed, most field-level maintenance on R390s was almost certainly carried out by radiomen with VOMs. Sometimes

one finds a designated test point that the manual notes must be measured with a high-impedance meter to avoid loading error, or a note regarding what kind of meter was used to obtain the listed voltages, but often it was left to the tech to know.

Note that there were two basic designs of VTVM. Both used a 10 megohm or so divider string on the input with the selected tap driving one grid of a twin triode, the other grid of which was grounded. In the preferred embodiment, the tubes were deployed as cathode followers, with the meter between the cathodes (with appropriate scaling and zeroing circuitry). A schematic of a typical cathode-follower VTVM can be found here:
http://www.mcmlv.org/Archive/TestEquipment/Heath_IM-18.gif.
(Note 7 indicates that the indicated voltages were measured "with a VTVM or 20,000 ohms/volt meter.")

Other designs (the RCA Senior Volt-Ohmyst comes to mind) put the meter in the plate circuits. See http://bama.edebris.com/download/rca/wv98c/rca_wv-98c.pdf. This doesn't do any useful amplification of the measurement input, but it does amplify the DC errors in the tube circuitry itself. Consequently, range and zero drift all over the place on these meters. If you have a plate-circuit VTVM, you can cure this by converting it to cathode-follower operation. The same is true of the analogous FET-VOMs.

Date: Sun, 4 Jan 2009 15:50:36 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] R-390 C101 and C103 Caps

>> I am a big fan of VTVM meters <snip>

Tisha's being a fan of VTVM's may well be based in part on an aspect not mentioned yet in this thread: DVM's of the modern sort have no resistor at the *end* of the test leads. VTVM's of the kind common at the time of the R-390's did. The non-isolated test probes, whether having test prods or clip leads, can load the grid circuit of an R-390 or R-390A with respect to RF or IF signals there. The mixer grids have the local oscillator signal present. If that signal gets "sucked out" by the capacitance of the meter the results will be confusing at the least. It isn't the buffering of the meter that matters when measuring oscillator or mixer grids, but the isolation provided to the circuit under test. Certainly the VOM's common in the time of the R-390A would cause trouble measuring some points in them. <Roy on Soap Box - OFF>

Date: Fri, 13 Feb 2009 00:28:15 -0800 (PST)
From: Steve Toth <stoth47@yahoo.com>
Subject: [R-390] test equipment question

Some questions for the veteran radio techs - I'm organizing to start work on a couple of R-390A's I just acquired.? What test equipment do I need (as opposed to "would like to have") to get these babies running? What I have now:

TV-7/U tube checker and spare tubes
AN/URM-25D signal Generator
Heathkit VTVM
Digital VOM
Digital Dial / Direct Freq Meter good to 50Mhz

Looking at the Y2K manual, pg. 1-12 and looking thru the stage-by-stage troubleshooting steps in Section 5, three other items are mentioned:

1.) RF Multimeter - can I use an adapter with?the VTVM or VOM?? How?
2.) Audio Oscillator that covers 425-3500hz @ 100mv
3.) Oscilloscope that can cover .2 to 2vdc/cm

If I do need'em what inexpensive models should I look for at ham flea markets (got a big one coming up in the Northwest),?places like Fair Radio,?on Craigslist and (last preference)Epay?

Date: Fri, 13 Feb 2009 06:40:37 -0500
From: Roger Gibboni <rgibboni@dulye.com>
Subject: Re: [R-390] test equipment question

The only thing I would add to the list is a 100MHz scope. A Tektronix 465 is a great scope that you can get for a few hundred dollars. This will be invaluable in troubleshooting and will do the job of the RF VTVM as well---Roger WA3YTM

Date: Fri, 13 Feb 2009 08:58:47 -0500
From: "Miles B. Anderson, K2CBY" <k2cby@optonline.net>
Subject: [R-390] Test Equipment Question

If you're cutting down to the essentials I really don't think you need anything more than you've got. If you need an audio generator you can take 400 Hz and 1kHz from the URM-25.

An RF probe for the VTVM is helpful but you've got to be careful that the input capacitance is small enough so that you don't overload the citcuit and kill off the signal you are trying to measure.

I have several scopes in the shop but frankly I've never needed to use one to service an R-390A, though it would be handy to check whether the crystal oscillators are running. (I've also used a scope with a vertical amplifier output to act as a preamplifier for my frequency counter.)

Perhaps the best oscillator check in the absence of a scope is to listen on the oscillator frequency (or multiple) with another receiver. You can also use the VTVM to check the DC grid voltage to determine whether an oscillator is running.

The only other service tool that I have found really useful is an EICO Model 950 R-C bridge to measure capacitor values & leakage, but you can live without it -- especially if you intend to re-cap the R-390A.

Date: Fri, 13 Feb 2009 08:06:51 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] test equipment question

If it's just a matter of cleaning them up, checking and replacing tubes and then alignment you have it covered. If you have to do any troubleshooting I find myself lost without an O'scope, frequency counter and my trusty cap analyzer. That's not to say it can't be done without those items because guys do it every day. Just like any job the tools make the job a bit easier and certainly more pleasurable. If I had to leave any of the above on the table I would keep the O'scope... One can be bought cheap usually...ebay is a good source for test gear cheap. Most all I use came from there and it's all HP and Tektronics.

Date: Fri, 13 Feb 2009 14:32:17 +0000
From: "Bill Kirkland" <kirklandb@sympatico.ca>
Subject: Re: [R-390] test equipment question

I haven't done my R390/a's yet but I have done several sp-600's (ooops wrong group). Once you have done the resistance checks and voltage checks I think you are half way there. If you have to dig into a "module" I gather extension cables would be handy. These are cables which allow you to remove the

module from the unit but keep it plugged in and up and running. I believe it was Fair Radio that used to sell a connector kit for making these up.

Date: Fri, 13 Feb 2009 09:52:33 EST
From: DJED1@aol.com
Subject: Re: [R-390] test equipment question

I think you've got all you'll need for troubleshooting the radios. Almost all of the troubleshooting is checking tubes, measuring voltages and injecting signals. I don't remember touching mine with an oscilloscope, although it's the next acquisition I would recommend. I guess the audio oscillator would be helpful for troubleshooting the audio section, although I haven't seen much discussion of audio problems over the years. I've found my Tektronix 2215 to be good. It's a 60 Mhz scope, small and light, and sells for $100-200 lately. For the audio oscillator, I started with a boatanchor TS-382, but replaced it with a smaller solid-state unit so there was room on the bench for the radio. You can probably pick up a good small HP for $50. Enjoy the radios

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Date: Fri, 13 Feb 2009 10:59:46 -0500
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] test equipment question

I think any excuse to get an HP 200AB or 200CD is worth it :-). They do remarkably well at staying constant amplitude as you turn the dial or flip ranges. The light bulb in a Wein bridge is hard to beat!

Date: Fri, 13 Feb 2009 11:14:28 -0500
From: David Goncalves <davegoncalves@gmail.com>
Subject: Re: [R-390] test equipment question

However, do try to get WORKING test equipment - having to fix your equipment before fixing the radio you actually care about gets tiresome.

Date: Fri, 13 Feb 2009 08:16:07 -0800
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: Re: [R-390] test equipment question

What is on your test bench now will get the job done. Add a 600 ohm resistor to hang on the speaker terminals to check the signal +noise to noise ratio. I never needed more than the items you have already listed. Other pieces of test equipment might make trouble shooting faster, but will those failures occur? Not to restart the capacitor, beat the dead horse discussion, a cap analyzer that test caps at rated voltage is nice, but one could save the money to purchase said item, just buy the caps and replace BBOD's etc., before plugging the receiver into a wall outlet.

Date: Fri, 13 Feb 2009 10:03:45 -0700
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: Re: [R-390] test equipment question

> However, do try to get WORKING test equipment.....

Poo! Such sacrilage. It is a time honoured tradition that your test equipment will have quit working when you need it. You have a greater sense of accomplishment if you had to repair the VTVM and at least one of the scope probes before addressing the main problem.

Date: Fri, 13 Feb 2009 11:16:43 -0600
From: Mike Andrews W5EGO <mikea@mikea.ath.cx>
Subject: Re: [R-390] test equipment question

True. And it provides such a sense of satisfaction, once one gets over the initial rage, grief, and despair, and into the steely-eyed mood of absolute "This-WILL-Happen" determination. I haven't yet had to descend to making my own Allen wrenches, but have more than once made a screwdriver of the right size. I suppose I could (in principle, at least) make a soldering iron, but I really hope to
avoid that extremity.

Date: Fri, 13 Feb 2009 12:20:08 -0500
From: David Goncalves <davegoncalves@gmail.com>
Subject: Re: [R-390] test equipment question

Common comments from system andministrators. Coincidence? This hardware engineer says 'no uncalibrated test equipment shall pass through this threshold; let the vintage radios do the smoking.'

Date: Fri, 13 Feb 2009 12:21:16 -0500
From: David Goncalves <davegoncalves@gmail.com>

Subject: Re: [R-390] test equipment question

But I do have a Measurements Model 80 signal generator in the shop that I restored...

Date: Fri, 13 Feb 2009 09:43:09 -0800 (PST)
From: wli <wli98122@yahoo.com>
Subject: [R-390] R-390] Test Equipment Question

You have all you really need EXCEPT for the all-important Bristo wrench set. Get them from McMaster. For alignment, all that is needed is an AC voltmeter with a dB scale, a 600 ohm resistor, and a URM type RF generator. The AN/PSM-4 was called for in voltage and resistance checks (20K/volt VOM). A TV-7 will quickly cull out the bad tubes and give you an idea of which tubes are *hot*. For convenience, I have found tube extenders useful in checking voltages. Tube extenders make it a lot easier to access the pins rather than trying to access them under the chassis. All the other gear makes things more fun to do, appease our desire for engineering precision... but are not required to do the job.

Date: Fri, 13 Feb 2009 11:55:25 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] test equipment question

I know that this is broaching on heresy to mention this; I found the URM-25D to be less than helpful when compared to a good signal generator. It is drifty, the impedance matching module is a joke and it is hard to get repeatable results when trying to chase the performance dragon. But; if you use a good frequency reference (like the 100 KHz calibrator and that is not waay off and WWV) you can get darned close to being on frequency. If you dare to dabble with the compensation screws on the PTO to correct linearity you need a much better frequency counter and signal generator. Of course, gettting used HP/Agilent equipment will cost you more than any one radio would ever sell for. You can find a really decent HP 400 series VTVM or a Boonton that would do an excellent job on measuring RF levels for a song-and-a-dance. The original maintenance manuals were written around the inherent limitations of the test equipment available at the time (URM-25's). While I try to keep the filaments glowing and avoid transistor/IC based radios in my setup I do use more modern test equipment.

Date: Fri, 13 Feb 2009 13:12:45 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: Re: [R-390] test equipment question

That's the reason I got the 8708A phase lock synchronizer to keep my 606B signal generator on frequency. Of course, they fill up a big spot on the bench!

Date: Fri, 13 Feb 2009 12:22:42 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] test equipment question

Actually a good HP-8640B can be had on ebay for fairly cheap....don't go to Fair Radio though... not the place to buy test gear.... except maybe scopes. The 8640B is an analog sig gen but has a lock feature that will lock it down to the dialed up freq so no problems with drift. I would imagine a working example could be had for less than $400. I didn't like the URM-25 either and got rid of it quickly.... The HP-606A and a freq counter was a better solution and then I added the 8640.

Date: Fri, 13 Feb 2009 12:27:02 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] test equipment question

What is really cool is to buy a surplus Efratom, rubidium frequency reference that has a 10 MHz output (approx $100). All of the HP gear I have has a frequency reference input to the counter, scope and oscillator are all using the external reference. Of course it takes week for the frequency reference to get down to the part-per-billion stability and you can never turn the thing off (it is on a battery string to keep it going during power outages). I do a-lot of microwave and VHF/UHF design professionally and work out of my home lab (coincidentally my radio room) so the test equipment all supports that role. Sigh, maybe someday I can get a vector impedance meter and a HP 8350B if I win the lottery. Of course IF I won the lottery the lab would be more for fun than work. By that time if anyone mentioned QAM anything I would run screaming from the room.

Date: Fri, 13 Feb 2009 15:42:53 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] test equipment

I actually find my AN/URM-25D to STILL be effective. It warmed up for a few hours, had a high stability HP counter in-line, AND for three days it was rock solid. The only thing I've had to do with it from a maintenance standpoint in the recent past, was to remove the power cord, trim it back, and re-attach it. It developed a "quirk" that "IF" the cord was run to the left, I got no power. "IF" the cord was run to the Right, power was had. I follow the NAVSHIPS manual for it. Perform the "zero" per manual, and calibrate. Checks against WWV also. When I have to, I'll replace it. Don't have a NEED to as of yet. It sure beats the OLD GR-1001A! <LOL> The VTVM is a TS-505D/U.

Date: Fri, 13 Feb 2009 23:50:25 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] test equipment question

I'm no fan of the military signal generator, but if it's working properly it will get you through (particularly if you can trust your counter). I third (or fourth) the recommendations of the HP 8640B. You can get brass replacements for the nylon gear that shrinks. In any event, I rarely use a sig gen for *troubleshooting* -- rather, for calibrating and optimizing (in particular, the RF gain). I happen to like using a 'scope for most of my measurements, but YMMV. A Tek 465B is way overkill, but nice to have. I prefer the comparable HP scopes personally (1740 series), but I like Teks just fine. I see no need for an audio oscillator as long as the sig gen has an internal modulation oscillator. If you feel the need for an RF voltmeter, get (better yet, build!) an RF probe to use with the Heath VTVM. I don't have one, and have no idea what I'd do with one (but then, I use a 'scope for that).

The last thing I'd like to address is the philosophy of radio service. Many of the comments posted so far seem to advocate a "shotgun" approach. I don't. There are certain components in most electronic products that are either failure-prone or that have devastating consequences if they fail (the infamous C553 in 390As is a prime example of the latter; all of the tubular capacitors in SP-600s are good examples of the former). For the 390 and 390A, these components are are well-documented. Beyond these, I see no reason to replace anything that hasn't given you a specific reason (except, perhaps, the electrolytic power supply caps, which might justify replacement just on principle). Tubes, in particular (with a precious few exceptions), don't need to be changed "for the heck of it." In most cases, they don't even need to be replaced when a tube tester says they are "weak." With the exception of the first RF tube, all the tubes in a 390A can be dead flat -- 25% or less on a good tube tester -- and the radio will easily meet its specifications. (I know -- I once filled a 390A with dead flat tubes on purpose and measured it.) Time was when one might replace all of the tubes just so you wouldn't have to think about them again for a decade or three. Nowadays, however, many of the new tubes available -- even lots of NOS tubes -- are not reliable (the new tubes because they are not made to a high standard, the NOS tubes because they have been leaking ever so slightly for 30-60 years and now have less than perfect vacuum). So, often, the tubes in the radio are as good as you are going to do in terms of future reliability.

The real bugaboo in 390s and 390As are the crystals, which have aged all out of spec by now. If I wanted to refurbish a 390 or 390A, I'd start there (if you can find anybody who can supply quality crystals today; I've heard mostly horror stories the last ten years or so).

Best regards, Don

Date: Sat, 14 Feb 2009 05:51:33 -0800 (PST)
From: Michael OBrien <mikobrien@yahoo.com>
Subject: Re: [R-390] test equipment question

I have 2 of the 8640B's and like them. How can you tell if the gears are cracked or broken? One of mine had been rebuilt that I bought from a guy on ebay that does that kind of work

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Date: Sat, 14 Feb 2009 08:54:20 -0500
From: "Kim Herron" <kim.herron@sbcglobal.net>
Subject: Re: [R-390] test equipment question

Peel the covers off and look. If the gears are cracked, you'll see it.

Date: Sat, 14 Feb 2009 08:06:55 -0800 (PST)
From: Steve Toth <stoth47@yahoo.com>
Subject: [R-390] test equipment question

Thanks for the inputs on test equipment. I now have a schematic for a simple RF probe to use with the VTVM, good input on choices for my next signal generator, and good suggestions for an inexpensive O-scope (the info actually helped me avoid what could have been a potentially bad purchase of an O-scope locally).? Received some good troublshooting tips too!

Date: Sat, 14 Feb 2009 14:49:58 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] test equipment question

>.....8640B ....how can you tell if the gears are cracked or broken.....

The gear hubs sometimes crack and you can tell by inspection, as has already been mentioned. Also look at the one large nylon gear -- it can shrink enough that it loses proper tooth engagement and can skip even if it is not cracked (this is the most common gear fault I have observed).

Date: Sun, 15 Feb 2009 01:56:48 +0000 (UTC)

From: odyslim@comcast.net
Subject: Re: [R-390] Test Equipment

I agree with Pete. I recently had an R-390A that was so deaf the calibrators could not be heard. Slowly tuning the bands, I found the faintest carrier, it was WWCR. I can usually hear it with no antenna. Anyhow, I was able to bring the radio up using that carrier and the alignment tools only. The radio was put together from spare parts and items bought on ebay. It was a pile when I started. Totally deaf when completed. Everything was out of whack. My URM-25 was bought refurbished from a gentleman on this list. It works very well with a voltmeter for R390xx gear. I do also use a frequency counter as an option. It is home brew.

Date: Sat, 14 Feb 2009 18:13:57 -0800 (PST)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] test gear

I hang a small commercial freq counter on the high output RF connector on my URM-25F. Makes alignments a lot easier on me. Of course, if and when one wants to to measure SN/N then you have to cap that jack.

Date: Sun, 15 Feb 2009 14:51:13 -0500
From: "Patrick" <brookbank@triad.rr.com>
Subject: Re: [R-390] test equipment question

To me, the best Frequency Generator that I have is a 0-464/SRC Synthesizer Electrical Frequency. works from 2 to 34 MCS, is solid a a rock and plenty of adjustable power to use with a small antenna. A little big a heavy (rack mountable) but very reliable. The other one is an old tube one, a Hampden HBT 477 that has a Xtal socket, perfet for testing crystals. Anyhow, only the opinion of and old FA%&.

Date: Sun, 15 Feb 2009 15:00:19 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] test equipment question

I guess I'm STILL in the dark ages! from 2 to 34 Mc doesn't cover the IF. I do NOT require an HP-8640B just to replace either the URM-25 NOR the GR-1001A. The B&K Frequency counter does fin, have an HP-410B (or C - don't remember at THIS moment), ant a TS-505D/U. Old Tek scope that I can use to ensure the 455Kc IF isn't over done and distorted. I have difficulties understanding the NECESSITY for all this NEW test equipment for this OLD '50s radio. Cecil, tell me you NEVER used this old gear to setup an R-390 or R-390A!

Date: Sun, 15 Feb 2009 15:04:42 -0500

From: "Patrick" <brookbank@triad.rr.com>
Subject: Re: [R-390] test equipment question

Sorry, meant 2KCS to 34MCS, that is what happens when you are an old FA*%.

Date: Sun, 15 Feb 2009 20:06:06 -0000
From: "Lester Veenstra" <m0ycm@veenstras.com>
Subject: Re: [R-390] Test Equipment

Not necessarily improvements in the results, but certainly in the ease, speed, and reproducibility. Been there and done that (CTM1) and I have to say it was a joy to get do the job with an HP 606 and 5248. In retrospect, what I would really would like to have had back then would be a synthesized sweeper to get the IFs to where they can be and noise source to properly characterize sensitivity, rather than the bogus numbers you can get by tuning the SigGen to a hot spot (peak) in the IF response.

New rant:

So yes, you can do good things to an R-390 with a URM-25 and a PSM-4. On the
other hand you can do bad things with a tv-xx. The only useful tube tester you should use, and will ever need, is the R-390. What you get, from a tube tester, is meaningless where it is critical, and frequently condemns perfectly usable tubes. Instead of spending money on tube ?testers?, you should spend it on a collection of spare tubes.

Date: Sun, 15 Feb 2009 14:12:26 -0600
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] test equipment question

I have been watching this thread for a while and I thought I would weigh in. I am fortunate to have invested in a fair amount of test equipment over the years. Most by buying it broken and repairing it. My love of test equipment is just as avid as for old radio's. I use an IFR 1200 service monitor for a signal generator. Both frequency and gain are calibrated, saving time each time I move the dial. I use an HP 3577 to adjust the IF chain. I can truthfully say I have tried doing IF alignment the old way and have always improved my work with the analyzer. Of the many R-390's and A's I have repaired it is always a thrill, after all of the RF coils and mechanical assembly has been removed cleaned thoroughly and reinstalled to set the radio on the 7.999 + marks, to crank about 100 mV of RF in the antenna and hear a week signal! The radio is responsible for that part!! The story here is; use what works for each of you. We all have preferences, there is no right or wrong equipment, my 2 cents worth ...

Date: Sun, 15 Feb 2009 15:19:53 -0500

From: Jon Schlegel <ews265@rochester.rr.com>
Subject: Re: [R-390] test equipment question

I guess I don't see the newer stuff as what you need but rather as tending to make the job easier if it happens to be available. As always, tradeoffs are involved.

Date: Sun, 15 Feb 2009 15:37:14 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] test equipment question

Tom, You have hit it on the head! The "newer" equipment "may" well make it easier and quicker. However, I don't get paid by the hour to work on MY radios. So *IF* I need to let things warm up for a bit longer, (The R-390A HAS to warm up so that IT has quit drifting), I can let the URM-25 simmer also.

Those that work on this older gear use what WE desire, and what WE have. I have just as much fun keeping the test gear running well as I do the R-390A and SP-600.

Date: Sun, 15 Feb 2009 18:38:02 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: Re: [R-390] test equipment question

OK, I will extend this thread. I need a sweep generator. I would like to have a HP 8601A but they seem to be going for a little more than I want to pay given my limited use for one. About 60 MHz is as high as I need it to go but that rules out a simple function generator as 20 MHz seems to be their limit. I think I want something better than an old TV sweep generator.

Date: Sun, 15 Feb 2009 18:45:17 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: Re: [R-390] Test Equipment

Tube testers are about the least useful piece of test equipment ever invented. I can't understand their popularity or the astronomical prices they command.

The only bit of truly unambiguous information you can get from a tube tester is that the filament is burned out. I don't think you need a tube tester to find that out.

I was that the Orlando hamfest yesterday and was astounded at the asking prices for any kind of tube tester.

Date: Sun, 15 Feb 2009 17:50:35 -0600
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] test equipment question

I have a couple, the Texscan, which I could never find much information for, has been the old standby. I use a 8640 HP most of the time. I did have a Wavetek in the past, both the Wavetek and the Texscan have scope connections which make them easy to use. About 10 years ago there were a lot of sweepers on the surplus market.

I guess that was back when we still made things in the US. I would vote for the Wavetek, they are relatively easy to fix if they have not been molested ... tom, N3LLL

Date: Sun, 15 Feb 2009 19:16:11 -0500 (EST)
From: "Richard W. Solomon" <w1ksz@earthlink.net>
Subject: Re: [R-390] test equipment question

One reason the Wavetek is so cheap is that it is a 75 ohm output device.

Date: Sun, 15 Feb 2009 20:15:58 -0600
From: <wb5uom@hughes.net>
Subject: Re: [R-390] test equipment question

Bob probably said it best: "Those that work on this older gear use what WE desire, and what WE have" Being able to use what you have at hand is what is important I think.

Now, I certainly dont know it all, and probably am lacking in the complete abilities of some of the equipment I am lucky enough to have. (If you call being in business for yourself lucky that is!) Watching someone wanting to measure or test a piece of equipment and saying they can't do it for one reason or another, and then showing them that they CAN do it with what they have is always fun.

Yes, my IFR Com 120C is better than the Cushman CE-4 I started with in 1985. But its still what you can do with it thats important.

Date: Sun, 15 Feb 2009 20:45:58 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] test equipment question

I've used the IFR 1200S and currently carry the IFR Com 120B. Pretty good stuff...the 1200S does SSB. The latest offerings from IFR are junk...Looks like they have been bought out by Aeroflex. Another good one is the earlier IFR 500. Small and lighter....cheaper! All way overkill for the hobbyist though....too expensive. (except mayby the 500)

Date: Sun, 15 Feb 2009 20:54:36 -0600
From: "Jim Shorney" <jshorney@inebraska.com>
Subject: Re: [R-390] test equipment question

I've got an IFR1000A that I have to whack once in a while. OK for FM work, but not really stable enough for SSB. It needs a good cleaning and probably caps. Do any of you guys know how to fix a Com 120A? Stole one at an employee auction and it worked for about a month. Won't boot now, just beeps at me. Haven't had time to crack the cover.

Date: Sun, 15 Feb 2009 22:24:11 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] test equipment question

> One reason the Wavetek is so cheap is that it is a 75 ohm output device.

(not meaning to sound sassy): And this makes a difference .. how?

Date: Sun, 15 Feb 2009 21:41:52 -0600
From: <wb5uom@hughes.net>
Subject: Re: [R-390] test equipment question

Well, I have a 120A and a 120C and don't consider them junk, and waiting on the new Aeroflex 3920 to arrive. Have very little trouble out of either, but the maint agreement sure helped every now and then.

Date: Mon, 16 Feb 2009 20:49:48 -0500
From: bonddaleena@aol.com
Subject: Re: [R-390] 8640B gear question

Hi, I've really enjoyed the discussion about vintage test equipment. I too enjoy collecting TE and working on them as much as my vintage radios. I am fortunate, because I've been collecting this stuff for years and being a big time pack-rat, I never throw ANYTHING away. But I am running out of room! I have aligned many a receiver with my URM-25D. It's in semi-retirement at this time. My 606A gets most of the work on one bench. I have a storage building 1/2 full

of 608 (*)s. I bought a pretty nice 8640B off of ePay last year. While repairing the 'fine tuning', I noticed I had some cracked gears. One poster mentioned metal gears. Anyone have an idea where they might be purchased??

Date: Tue, 17 Feb 2009 01:02:26 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] 8640B gear question

Another list member asked me the same question off-line, and I'm trying to find the source for the brass gear. As far as I know, the seller made only the large gear in brass, because it is the only one large enough to shrink enough to cause skipping -- but I could be wrong. I'll post the information when I find it, but if anybody else knows, please feel free to do so. Heck, if there's enough demand, perhaps I'll tool up to make some. Anybody have an 8640B gear set to use as a model? (Not enthused about tearing mine apart if I can find one that is already
apart and doesn't need to go back together....) Best regards, Don

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Date: Tue, 17 Feb 2009 08:22:53 -0800 (PST)
From: Steve Toth <stoth47@yahoo.com>
Subject: [R-390] Question mainly on connectors

I've gotten some great feedback on test equipment from the group, and scored both 7 & 9 pin test adapters and replica spline wrenches for my two R-390A's. Haven't found a ready made octal socket test adapter yet (other than Nebraska Surplus at an exhorbitant price) - anybody have an extra? Ideally I'd like to make some module extender cables. Anybody know of a source for the required deck sockets and harness plugs? Also what are the correct part numbers for the connectors and sockets?? I've tried to search on the numbers in the Y2K manual and haven't found them on the net. I know there has to be a military or surplus connector supplier out there that has them. Lastly, one of the R390A's has had the electrolytics in the AF deck replaced.? They are mounted in octal base plug-in relay housings. One has the keyway broken off.? Anybody know of a source for these?? I've looked at Mouser, Newark, Allied and Grainger with no luck.

Thanks in advance - between the Y2K and Y3K beta manual, The "Pearls", the Hollow State Archives?and the feedback from this group, I'm finding I'm able to get all my questions answered!

Date: Sat, 21 Feb 2009 14:59:35 -0600
From: "Barry" <n4buq@knology.net>
Subject: [R-390] Leader Equipment

Is Leader brand test gear any good? Looking at an audio signal generator and wondering if the brand is reliable.

Date: Sat, 21 Feb 2009 15:20:06 -0600
From: Grant Youngman <nq5t@tx.rr.com>
Subject: Re: [R-390] Leader Equipment

Over the years I've used a variety of Leader test gear, including a scope, and various signal generators. The stuff isn't H-P or Tek, but it always did what it was supposed to do, and reliability was never an issue. I still have a Leader transistor curve tracer, which I haven't used in quite a while, but it works pretty well, too.

Date: Sat, 21 Feb 2009 18:40:37 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] Leader Equipment

Thanks for all the input, guys. I had an HP 200CD and liked it, but sold it a year or two ago. I was thinking of getting more test gear and thought I'd go for an audio generator a little less bulky, etc. I saw a hand-held jobbie on eBay that looked kind of cool but more than I want to spend for one.

Date: Sat, 21 Feb 2009 21:00:33 -0500
From: "bill riches" <bill.riches@verizon.net>
Subject: Re: [R-390] Leader Equipment

Yes! An oldie but goodie!

Date: Sat, 21 Feb 2009 21:59:32 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Leader Equipment

Leader made a wide variety of items of differing quality over the years. Based on what they made in the '70s, I always thought of them as kind of like B&K (not Bruel & Kjaer -- B&K). In the '80s and '90s, Leader tried with limited success (as far as I could tell) to move upmarket, with a line of microprocessor-controlled equipment (lots of buttons, no dials). I have a Leader 1300S 2 MHz analog sweep/function generator that works OK. I think those were made in the '80s, but I'm not positive. As another list member said, it's no Tek or HP, but it does sweep and it was cheap. It's relatively light, and if I need a portable sweep/function generator I sometimes grab it, particularly if I'm worried about damage/theft/etc. I generally use a Tek SG504 40 MHz sweep/function generator if I'm not expecting the going to get tough because I can also conveniently bring other useful TM-5xx modules. Not that the Tek 5xx stuff is all world-class, mind you -- some of the modules are plenty quirky. The DM501A DMM, for example, puts so much hash and other digital garbage out of its input that you can't get it anywhere near a radio, and the frequency counters tend to be fussy about triggering. Best regards, Don

---

Date: Sat, 21 Feb 2009 22:08:55 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Leader Equipment

Some thoughts on this:

- A hand held instrument will usually be somewhere else when you want it. A larger sit-on-the-shelf thing is likely to be where you last left it. Rack mounted stuff is almost certainly where you last saw it.

- Don't spend a lot for test gear. Certainly don't buy new stuff. Nowadays, you can get really good stuff that's a bit older and still working just fine for not much money. Hamfests, ePay, wherever. (Hamfest season is coming, right??)

- Itsy bitsey miniaturized computer controlled instruments may have loads of "features", but simplicity of operation is very valuable.

- Maybe we can divide all of us into two groups: Those who work at home at a bench or workshop, and those who go some where to work on someone else's equipment (and may get paid to do it.) Keep in mind which type you are. A piece of test gear does NOT need to be portable if you never take it anywhere. The GR type 1310 audio oscillator is one of my favorites. It has just three controls: Frequency range, frequency set (with big easy to read dial and a vernier knob) and output level. What more do you need?

Date: Mon, 23 Feb 2009 15:31:44 -0600
From: "Barry" <n4buq@knology.net>
Subject: [R-390] HP-606A

Well, as much as I'm trying to keep from collecting radio-related "stuff", I "won" an HP-606A today. Any advice on this one?

Date: Mon, 23 Feb 2009 20:56:51 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] HP-606A

Yes: here are some random suggestions:

0) Find a good place for it on your bench and leave it there.

1) Put the 12B4's used in the power supply on your want list.

2) Do a good mechanical overhaul/lubrication. The mechanicals of that thing are one of it's strong points. You won't realize what a gem this thing can be till the tuning and output attenuator are working like new.

3) Do start looking for an 8708A. This gadget allows precision and stable setting of the frequency However, you need the B version of the oscillator to use it. So start looking for a nice B. If you have an A and a B, then you can build a signal combiner and do intermodulation tests on receivers.

4) Replace the filter caps and run the generator often. It likes to be used.

5) One of my collected emails on the thing talks about poor long term frequency calibration stability.. Possibly from the ceramic forms used in the oscillator tank circuit. So .. leave the thing on all the time.

6) Stand by for a copy of my notes file - sent separately. A few interesting observations and discussion of the attenuator.

Date: Tue, 24 Feb 2009 08:06:11 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: Re: [R-390] HP-606A

I would second every thing Roy has to say about the 606A&B. I have a 606B with the 8708A phase lock unit. It's a little fussy to get locked up but once it is it will just sit there. I have given up on the dial calibration and have my 5245L frequency counter, also a BA, connected to it. I have never had a problem with 12B4 in the power supply but I know it is a problem in my 428B DC ammeter power supply. Don't plan on moving it very often. I bought my 606B a few years ago at the Orlando HamCation. I had to drive my car into the tailgate area to haul the thing out. It was in "perfect operating condition" until I got it home. It had a sticky meter but I did get the particles cleaned out. Due to it's weight, getting the cabinet aligned with the panel to put it back together was a b***h. Roy, if you have some good notes about maintenance, please send them to me.

Date: Sat, 28 Mar 2009 22:35:42 -0700

From: "Leigh Sedgwick" <bipi@comcast.net>
Subject: [R-390] Warning - off topic but technical

I have an old Fluke 77 digital voltmeter. The specifications in the manual do not specify a frequency range for AC measurement accuracy. Does someone on the list know the frequency limitation of this meter. I'm assuming it is around 500 hz or is it even lower than that? Sorry for the off topic post but I know there are some very knowledgeable folks on here.

Date: Sun, 29 Mar 2009 02:55:54 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Warning - off topic but technical

According to the operator's manual, which is available for download on the Fluke web site (see "75/77" for the original 77):

http://us.fluke.com/usen/support/manuals/default.htm?prodcategory=OBS

the rated frequency range for AC voltage and current measurements is 45cps - 1000cps except that for the lowest voltage range it is 45-500 Hz.

(found the manual by Googling +fluke +77 +manual +download)

Date: Sat, 16 May 2009 22:09:02 -0500
From: "Barry" <n4buq@knology.net>
Subject: [R-390] Sources for HP410C AC Probe

Anyone know of a source for the AC probe for an HP410C (besides eBay)? My "new" one doesn't have a probe.

Date: Sun, 17 May 2009 00:40:48 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Sources for HP410C AC Probe

Make one. It's nothing but a tube, two capacitors, and a 22 M resistor. We used to build them in metal 35mm film cans, but they're long gone, so you'll need something else.

Date: Sun, 17 May 2009 01:53:23 EDT
From: JRFKE5RI@aol.com
Subject: Re: [R-390] Sources for HP410C AC Probe

Sorry, but I believe that this information is incorrect. Go to
http://bama.edebris.com/manuals/hp/410c/
(http://bama.edebris.com/manuals/hp/410c/)
and download the PDF. Look at page 52 of 63. The probe incorporates a vacuum tube diode. Therefore any substitute you may build must also contain a diode. I would suggest a signal type. Good luck with your project.

Date: Sun, 17 May 2009 07:42:07 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: Re: [R-390] Sources for HP410C AC Probe

I just read an article describing how to build a AC probe using an IF transformer can for the housing. I will dig around and see if I can find it again.

Date: Sun, 17 May 2009 09:47:36 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: Re: [R-390] Sources for HP410C AC Probe

The article is in the June 2008 issue of Electric Radio. It is titled "A Weekend Project An AC/RF Probe for the HP-410C Voltmeter". The 410B and the 410C used the same probe. The differences are; early versions of 410B used a diode with a different filament voltage so you have to check that and the the probe for the 410C is plug-in not hard wired like the 410B.

Date: Sun, 17 May 2009 14:06:36 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Sources for HP410C AC Probe

<snip> By the way, you don't have to use an EA53 for most things you'll want to do -- a 6X5 will work fine. Note that most HP 11036A probes that you find on the market today will need a new EA53, so make sure you know where to find one (and budget accordingly) before buying a used probe.

Date: Sun, 17 May 2009 13:15:04 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] Sources for HP410C AC Probe

Does anyone know if the 410C can use either the EA53 or 2-01C? I know the 410B has a rheostat to allow adjusting the heater voltage for either diode but am not familiar enough (yet) with the 410C to know if the heater voltage can be adjusted for either diode.

Date: Sun, 17 May 2009 14:22:46 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Sources for HP410C AC Probe

I do NOT believe the HP-410C has a pot for voltage adjustment. It is drawn directly from the 6V supply.

Date: Sun, 17 May 2009 10:46:37 -0800
From: "Scott" <scott@becklawfirm.com>
Subject: Re: [R-390] Sources for HP410C AC Probe

A 6X5 sounds a little big for use in a probe---how about using a 6AL5 double diode with both sides in parallel? A 6AL5 is only good for about 400 volts rather than the 1000 volts that the EA53 can stand but 400 volts is plenty for most applications and the 6AL5 is tiny by comparison an also offers similar heater to cathode capability.

Date: Sun, 17 May 2009 11:38:20 -0700
From: "Michael Hardie" <mike46@shaw.ca>
Subject: [R-390] HP-410C AC Probe

There was an article in ER magazine a few issues back on homebrewing a probe for the '410C. I think a 6AL5 was one of the possible tubes, but increased probe capacitance was a factor.

Date: Sun, 17 May 2009 14:35:38 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Sources for HP410C AC Probe

The 410C does not have a filament voltage adjustment (at least, the ones I have seen don't), but you could easily enough modify one to supply 5v for a 2-01C.

Date: Sun, 17 May 2009 15:13:17 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Sources for HP410C AC Probe

You're absolutely right, the 6AL5 is what I had in mind. The 6X5 is an octal power diode. Using just one of the 6AL5's diodes keeps the capacitance down and raises the high frequency limit of the probe a bit. Best regards, Don

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Date: Sun, 17 May 2009 15:13:30 -0400
From: rbethman <rbethman@comcast.net>

Subject: Re: [R-390] Sources for HP410C AC Probe

The 410B has TWO versions depending on ser. no. The 410B I have, does NOT have probes hard wired! There is a jack panel on the underside of the front. Amm of my probes are removable. (I'm trying to locate the DC probe that became detached! The wife went on a "tear" and moved things ALL over!) There are similar ser. no. issues with the manuals for the 410C!

Date: Mon, 18 May 2009 11:16:41 -0400
From: Jon Schlegel <ews265@rochester.rr.com>
Subject: Re: [R-390] HP410B Intermittent(s)

The recent thread on the AC probe for the HP410C prompted me to look at a nagging problem on my 410B. On Rx1 scale with leads open circuited and meter indicating full scale, an intermittent existed somewhere as the full scale adjustment was not stable. To make a long story short, the problem looked like a solderability problem AT THE TIME OF MANUFACTURE. The problem area was the smaller of the two resistor boards located on the left side of the instrument, same side as the function switch.

The specific problem seems to be poor solderability of the foil on the circuit board. They used rivets in the through-holes of the board to keep the foil anchored and the solderability problem of the foil looked like it prevented a good joint between the two from the get go. Removing the old gucky solder then liquid flux and heat seemed to give an OK joint. It was surprising to see that kind of problem inside of an HP instrument.

It may be worthwhile to check for problems like this on anything that has intermittent problems that uses this construction technique. As an aside, it looks like the schematic symbol for CR1 ("metallic" rectifier) is reversed unless they were using some other current-convention back then.

Date: Fri, 22 May 2009 09:29:28 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Filter caps

<snip>

On a side note, I had a very fun evening last night. I finally managed to get the HP606A on the workbench and started checking it out. The dial plate was way off from where it should be (something like 10 to 15 degrees) and I figured out that removing the big tuning knob revealed four screws that clamp the dial plate to the collar. I eye-balled the dial to have about the same amount of over-travel on both ends of the hairline and tightened the screws. The range change knob was incredibly hard to turn and found that was mostly due to hardened lubricant on the shaft itself. I disassembled it, cleaned, and relubed it and the range

switch is much easier to rotate now. I was figuring it was something much deeper in the mechanism and was surprised to find the dried lube could make that small shaft so difficult to turn.

When I started checking out the calibration, it was almost spot on on all but the top range. I must have gotten very lucky when I clamped the dial plate back in place. One range needed a slight tweak on the upper end and all but the top range didn't really need anything done. There isn't enough L or C to bring the top range into calibration, though. I'm not sure what I can do about that. I suspect something not on the oscillator turret that's not off enough to effect the lower ranges but is throwing the high range off. I don't think I could add or remove L on that upper-range coil given the way it is made. Anyway, it sure was fun to get back into working on a piece of BA gear again. Other than being dusty and needing some pots cleaned, some missing screws replaced, and new line-filter caps, it looks like a very nice generator. I think it has all Hewlett-Packard branded tubes as well.

Date: Mon, 25 May 2009 12:13:33 -0500
From: "Don Reaves" <don@reatek.com>
Subject: Re: [R-390] HP410B Intermittent(s)

> get go. Removing the old gucky solder then liquid flux and heat seemed to >give a ok joint. It was surprising to see that kind of problem inside of an HP >instrument.

Not unheard of. I once found the problem with an HP-200R with intermittent output to be that a b+ line leading from the power transformer had never seen a hint of solder. The wire was wrapped on the transformer solder lug, and it probably worked OK for a few years, then slowly oxidized. A slight variation of the Stockdale technique to restore operation of a BC-375 worked on the HP-200, before the proper repair was implemented.

http://www.youtube.com/watch?v=TBXmVqcAP6M (at about 2:30 in this clip)

Date: Mon, 25 May 2009 13:37:51 -0400
From: Jon Schlegel <ews265@rochester.rr.com>
Subject: Re: [R-390] HP410B Intermittent(s)

Finally got all the flakies fixed, calibrated the instrument and the 410B now works great. It was just surprising to see the as-manufactured poor solderability of the terminal boards. It took a lot of effort to find everything. The 122 Megohm input Z is quite the thing. Just moving my hand near the probe zooms the meter pointer around quite a bit.

Date: Mon, 25 May 2009 14:45:38 -0400
From: "Patrick" <brookbank@triad.rr.com>

Subject: Re: [R-390] HP410B Intermittent(s) and solder joints

Have a MFJ-929 Automatic antenna tuner that the circuit board where all the switches go, was covered by some sort of film, about half of solder points of the 8 switches (6 contacts each) never made contact with the board, GREAT QUALITY CONTROL BY MFG, after considerable ammount of work removing all the switches, scraping the board contact points and resoldering the switches, the tuner has performed great. Pat Joints some time do get cold with age, I know, my knees and hips are cold.

Date: Tue, 26 May 2009 09:24:51 -0400
From: Bill Kulze <wak9@cornell.edu>
Subject: Re: [R-390] PowerSDR

Dave, the attenuator is a switched pad of resistors, actually about 100 ohms impedance, but for this it's ok. Just so we're on the same page, PowerSDR is software. The hardware from them is the FlexRadio. You do need a hardware interface to get the 455kHz IF from the R390a to a 12kHz if to the soundcard. Have fun with it, I've found it to be an aid in alignment also. Kinda acts as a spectrum analyzer where I can see the shape of the filters as well as the tuning peaks.

Date: Tue, 26 May 2009 08:27:28 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] HP410B Intermittent(s)

I'd totally forgot that part of the movie. Now I have to get coffee out of the keyboard on the other computer. And send my pants to the cleaners. Folks here may be interested to know that the USAF (and, presumably, other services) had a 300-Baud modem with mechanical resonators, back in the late 1960s. It had glowbugs, too, as well as a regrettable habit of ceasing to produce tones. When it stopped whistling, then it was time to whack it _HARD_ on the lower right corner of the front panel to restart the resonators with a mechanical shock. We replaced that critter, but nowhere near soon enough for me, with a Rixon SeBit 24 that was about the size of a paperback book -- lots smaller than the 6 rack units that modem ate, and lots cooler, too.

Date: Fri, 29 May 2009 11:49:43 -0400
From: Barry <n4buq@knology.net>
Subject: [R-390] Parts Request

Anyone know where I can get one or two 10k, wirewound, linear taper, 2W, pot (preferably with screwdriver adjust)? My HP-606A ate one last night. I'd like

one similar to what's in there, but may end up having to go with a multi-turn pot if there's room for it.

Still no luck with a probe for an HP410C either, but a question about that one. If I use a silicon diode for a probe (to at least get low frequence AC measurements going temporarily), then do I need to account for the forward voltage drop across it? Does the EA53 and/or 2-01C have a similar voltage drop so it won't be an issue? For larger voltages it wouldn't matter, but on the low ranges, it might be an issue.

Date: Fri, 29 May 2009 20:53:31 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Parts Request

>.....If I use a silicon diode for a probe.....

Yes. You can minimize this by using a germanium diode (preferably gold-bonded) or Schottky diode (in either case, use a small-signal diode). The forward drop will affect the low-voltage ranges more than the high-voltage ranges, but note that germanium and Schottky diodes have rather low reverse breakdown voltages.

>Does the EA53 and/or 2-01C have a similar voltage drop.....

I don't have curves for the EA53 and 2-01C handy, but indirectly-heated small-signal diodes operated at very low current generally start to conduct when the plate is slightly negative WRT the cathode. A 1N34 would be one of the likely candidates, and it has a reverse voltage rating of about 60 V, IIRC. Why not use half of a 6AL5? Those are good for 330 PIV. The 6H6 (the once-common octal dual signal diode) has a PIV rating of over 400 V. Best regards, Don

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Date: Fri, 29 May 2009 23:50:33 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Parts Request

A kind list member did have data handy for the EA53, and it appears that it draws 1 uA when the plate is 0.5 V negative (yes, it draws positive current even though the anode teminal is still negative -- thank the Edison effect due to the space charge, which causes "space current," and, to a lesser degree, the contact potential due to the dissimilar materials used in the cathode structure). When the plate voltage is 0 V, an EA53 is drawing 10 uA; at +0.7 V, about 100

uA; and at 1 mA it is up to +4 V and rising fast (not surprising, given the 0.5 pF plate-cathode capacitance -- it takes a tiny cathode to get the capacitance that low, which is also why the useful life of these tubes is fairly short). Rated cathode current is 300 uA (peak 5 mA for no more than about 5 mS at a time). Extrapolating from the characteristic curve, the current is probably about 100 nA for an anode voltage of -1 V, and 10 nA for an anode voltage of -1.5 V.

Date: Sat, 30 May 2009 22:27:33 +0000 (UTC)
From: rdavis7@comcast.net
Subject: Re: [R-390] R-390 Digest, Vol 61, Issue 39

Ok Barry here's the deal. You forced me to move a mountain of "good junk" and come up with a perfect probe for your project. Its a military grade probe with a nomenclature (test probe mx-404-9B USM-116. Has the diode still in it. Ruggedized probe body with a nice rubber sleve covering it. Complete with cord (3 insulated conductors, 1 bare). Send me your shipping address off list and It will find its way to you. Only have 1 of these guys, sorry! Rick K8PJQ CCA 11437 Dayton bum. rdavis7@comcast.net

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Date: Sun, 31 May 2009 22:20:27 -0500
From: "Barry" <n4buq@knology.net>
Subject: [R-390] HP-11042A

Can someone please tell me what's inside of an HP-11042A? Is it simply a capacitvely coupled tee device with two N connectors and a "socket" for the HP-410* RF probe? I can't seem to find much information on these on the 'net.

Date: Sun, 31 May 2009 23:53:37 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] HP-11042A

> Can someone please tell me what's inside of an HP-11042A?

Information I have (a list of HP devices) says: "HP 11042A probe T connector N (for 410 series - same as HP455A)" and the HP 410 manual indicates to me that it s simply a line section (short coax line - no capacitors from input to output) with the port for the 410 probe. I can't put my hands on mine right now, or the
similar ones I have made by some other company (see below for an explanation for what those might be), but I seem to remember a capacitor coupling the center conductor to the RF probe tip.

I found this in my notes file about the HP-410B:

> I did my homework last night and have got the information your requested.
> Since several list members sent me comments about the overall 410 posting

> (thanks to all of you who replied), there may be others desiring the same
> information. So, here goes:
>
> The H-P probe to which I referred, and which was used by the military (as
> well as commercial entities) is: HP Model 11042A Coupler
>
> The 11042A has a pair of Type N connectors, one each male and female,
> allowing for in-line insertion between a transmitter or RF amplifier and
> load. The 410 - series meter AC probe is used with the coupler by
> unscrewing the probe tip and then carefully inserting the probe into the
> special "socket" on the coupler. Those of you who have the 410 meters and
> AC probe will note that there are a pair of small screw heads that protrude
> from the side of the probe body. Those screw heads are used as the
> grounding and locking mechanism for the probe when it is installed in the
> coupler. It is sort of like a giant BNC connector arrangement, because the
> action to insert the probe is a push-twist-lock sequence. The coupler has
> a special capacitor installed on a section of air dielectric transmisison
> line, and the probe contacts that capacitor when properly seated.
>
> I have a downloaded copy of the military manual for the 410 meters. That
> manual also refers to a neat accessory that I have never seen: it is the
> Model 11043A Probe N Connector. There is no photo of it, but from the
> description, I get the impression that this is a device that connects to
> the end of the 410's AC probe (probably also by unthreading the existing
> probe tip) and replaces the stiff wire tip with a Type N connector. If
> anyone on the list has one of these or has ever seen one, please let me
> know if my suppostion is correct. No, I do not wish to purchase one.
> However, this may be a very useful item, so I included it with this posting.
>
> I did not know until a few years ago that another company made a specialized
>version of the 11042A coupler described above. At a hamfest, I found an RCA
>Type CP-T75N coupler, Part #1044899-50. It is an exact duplicate in body of
the >H-P coupler, BUT with 2 important differences:
>
> 1) It is for 75 ohm system use, and is equipped with Type N 75 ohm
> connectors (which are NOT inter-mateable with 50 ohm Type N)
>
> 2) It has a different value of special capacitor for the probe to contact
> when inserted
>
> I suspect that this special probe was made for radar applications, as it
> was made by RCA Canada, Limited. It might have also been used in
> television systems, but I am not sure. RCA did a lot of radar work back
> several decades ago. ...
>

The HP archive site has a catalog that lists the 455a. You can get that catalog at:
<www.hparchive.com/Catalogs_Specialized/HP-Catalog-195x-UHF-equipment.pdf.

>But as you found in other places, it does not tell much about the insides.

Date: Mon, 1 Jun 2009 09:30:42 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] HP-11042A

Thanks for the info, Roy. I wondered how the probe connected to the adapter. I didn't think of unscrewing the probe tip, but I can see how that would work. I had seen the xreference to the 455A as well, but haven't seen any of those available either. I'll have to keep watching "the bay".

Date: Mon, 8 Jun 2009 13:05:54 -0500
From: "Barry" <n4buq@knology.net>
Subject: [R-390] OT(just a bit): From whence cometh the grid current?

I have an HP-606A that I'm checking over and have found the voltage on the screen grid of one of the 6AW8A amplifiers in the power supply is off (low) a bit. The voltage is supplied to the screen grid via a voltage divider from B+ that consists of a 1.2M and a 100K resistor from B+ (500V) to ground. With a 500V supply and nothing else connected, this theoritically gives 38V at the junction of these two resistors.

If I unplug the tube and measure the voltage at the screen grid pin, I get close to 38V; however, when I plug in the tube, it drops to about 32V.

My question is where is the grid current coming from? Is it coming from ground up through the 100K or from B+ down through the 1.2M? I assume it draws it from ground because as little as 1mA would drop a significant amount of voltage through that 1.2M resistor.

Sorry if this is a really dumb question but I just don't seem to understand how the current flows in this "simple" little circuit. I assume that since I'm measuring the voltage from ground to the screen and plugging in the tube drops the voltage, then the current is flowing through the 100K resistor; however, if I measure the before-and-after voltage from B+ to the screen grid, would I see a difference there too?

Date: Mon, 8 Jun 2009 12:58:16 -0700
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] OT(just a bit): From whence cometh the grid current?

Voltage dividers present to their load, an impedance equal to the top and bottom in parallel. See http://en.wikipedia.org/wiki/Th%C3%A9venin%27s_theorem .

Date: Mon, 8 Jun 2009 16:24:06 -0400
From: "Al Parker" <anchor@ec.rr.com>
Subject: Re: [R-390] OT(just a bit): From whence cometh the grid current?

and the screen grid does draw current, more significantly than a control grid might.

Date: Mon, 8 Jun 2009 18:40:01 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] OT(just a bit): From whence cometh the grid current?

Screen grids are positive and there fore must suck current out of the tube. As the voltage at the junction drops with the tube in play, more current must be going through the top resistor to give a large voltage drop. Some current is diverted from the bottom resistor through the tube to allow the bottom resistor to drop less voltage.

Date: Tue, 9 Jun 2009 19:09:16 -0400
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: Re: [R-390] grid current

You could have a gassy tube.

Date: Tue, 9 Jun 2009 19:03:00 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] grid current

I can check that. I tried swapping it with another with the same results; however, both are most likely the same age used under much the same conditions so both could be gassy.

Date: Mon, 13 Jul 2009 08:49:42 -0400
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] eBay Funny of the Week

Once, in trying to build a VFO, I managed to get the 6AH6 to squegg. It was producing no less than 3 distinct frequencies in very complicated waveforms:

1. The desired oscillation on the desired frequency (3.5 MHz) would start to build up.

2. A UHF parasitic (near 400MHz) would kick in as the 3.5MHz waveform built up and quench the oscillation.

3. Above cycle would repeat with a rep rate in the low kHz.

Why the handbook recommended a hard to stabilize UHF tube for use as a HF VFO, I never understood. I think it was there that I learned that mere specsmanship (looking up the tube with the "most" and "highest" in the tables) often does not produce a working design.<snip>

Date: Mon, 20 Jul 2009 16:44:07 -0500
From: "Barry" <n4buq@knology.net>
Subject: [R-390] OT: Problem with HP-606A linearity

I've been working on an HP-606A for a while and have come up on something I don't know how to correct. The linearity is not good. The specs say this thing should be within 1%, but I'm not getting that.

I could get the endpoints on target, but as the frequency went from lowest to highest, there was a gradual increase in the output frequency, peaking at a little over 4% at about 3/4 of the way up the dial and then dropping off rather sharply as it approached the upper endpoiint.

Someone bent the fins outward on the tuning capaitor in an apparent attempt to correct the linearity (or, perhaps more accurately, alignment with the dial markings); however, from what I could tell, this was the wrong thing to do. Since the frequency was too high at the "bad" points, then according to the LC formula, there isn't enough C (or perhaps not enough L?) at that position. At any rate, decreasing C didn't seem right and I straightened the fins.

The linearity is better now (about 3% max.), but it's still on the high side. Again, I assume this indicates eiher not enough C or not enough L at these positions.

Looking at the capacitor, it appears it is a custom-made job that was designed for a particular capacitance "curve". The edges of the rotors are not round but have flats along the way. I presume this is to "shape" the capacitor to agree with "curve" so as to align with the dial markings (I hope that made sense). At any rate, it appears there isn't enough C at or near the midpoint of the rotation so the output frequency doesn't match the dial all along its travel. Is there a common-knowledge way to get around this? While I can always ignore the dial markings and use the frequency counter, I'd like it to be within spec if possible.

The trimmer cap for the band I'm working on (530kc to 1800kc) is close to mid point (about halfway meshed) so that's a good thing. I just don't know what to do to make this thing "linear" again. I tried changing the position of the dial for

this band by resetting the endpoints up or down 50kc. In other words, 530kc to 1800kc became 500kc to 1730kc. This way, 1000kc was really 930kc, etc., but the problem didn't improve. I tried going the other way (580kc to 1850kc) with similar results. I was told there is a "sweet spot" where the dial plate could be repositioned and it might correct this problem but rather than move the dial physically, moving the endpoints like this is effectively the same thing.

I had thought about bending the fins on both ends of the capacitors, thus reducing the capacitance at both end points and effectively increasing the capacitance near the middle but this seems a bit of a far-out method. Are there other things that might effect this? Maybe someone on the list has had a similar problem with a 606A and could give me some Pearls of Wisdom?

Date: Tue, 21 Jul 2009 01:01:20 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] OT: Problem with HP-606A linearity

You are correct, the shape of the cap fins was selected to give approximate linearity. Typically, the outer fins are segmented radially so they can be adjusted segment by segment for closer tracking. Reducing the spacing increases the capacitance and vice-versa. The first thing I would do is what you did -- straighten the outward-bent fins. It sounds to me as if the variable cap is not adding capacitance fast enough as it enters mesh from the high end of the band, so try increasing this either by (i) bending the outer plates inward starting at the end where they start to mesh, or (ii) if you have rotation to spare, change the mechanics to give slightly more mesh when the dial is at the top limit. In either case, you would then adjust the inductor and trimmer cap. Remember to adjust the inductor for the low end, and the trimmer cap for the high end.

Do you have a manual for the 606? I don't, but some other HP oscillator manuals give detailed instructions for linearizing the dials, so I'd check the 606 manual. Best regards, Don

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Date: Tue, 21 Jul 2009 21:13:36 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] OT: Problem with HP-606A linearity

Yes, I have a copy of the manual but it doesn't discuss linearity. Just set the endpoints and not much else. As far as trying to move the plates of the tuning capacitor closer together, I'm almost afraid to try that as there's minimum clearance as it is. I might be able to squeeze 0.010" or so, but not sure if that would be enough to matter. Maybe I'll try it, though.

Date: Sat, 1 Aug 2009 08:55:40 -0500

From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] OT: Problem with HP-606A linearity

Just thought I'd post a follow-up to this. I found a very badly botched job someone did of replacing a resistor in the plate circuit of the oscillator and finally got a replacement for it this week. I was thinking the resistor someone had used might have some inductance that was upsetting the circuit so I replaced it with a carbon composition. After replacing the resistor, I rechecked the linearity and it hadn't changed - at least not significantly. Someone suggested that reorienting the dial in relation to the tuning cap is the correct way to do this. I was skeptical since I thought that changing the endpoint frequencies was equivalent to "slipping the dial"; however, I gave it a try. I was pleasantly surprised to find this had a very signicant effect on the linearity. The first test got me very close and the second attemp (moving the dial a little more in the same direction) got me pretty much within spec. Worst case is 1.1% (spec is +/- 1%). I created an Excel spreadsheet with some charts that show the baseline deltas (the "before" condition), the changes after straightening one set of fins, then the other set of fins, and finally the curve after moving the dial. Pretty interesting. I think if I move the "center" point (the linearity goes a bit negative and then a little bit positive), I think I can get the entire dial within 1%. Just thought I'd report back in. Maybe someone else will have the same kind of issues in the future so this might serve as reference material (as it doesn't exactly apply to an R390).

Date: Sat, 1 Aug 2009 12:56:07 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] OT: Problem with HP-606A linearity

Yes, it was you and a fellow from another list who used to work at HP and seemed to know this was the right way to go. Yes, I do plan to try to at least move the "saddle point" (the plot looks kind of like a sine wave) in an attempt to at least get the dial within spec. If there are other things I can do to reduce the errors, I'd be interested in knowing what they are (I hope it doesn't involve rebending those fins, though). One thing that I was curious about is a 2pF cap across both tuning caps (it is a push-pull oscillator). I wonder what it's purpose is and whether it might warrant replacing (I have a dipped silver mica for it but didn't put it in place as I didn't want to replace what appears to be a factory part if it isn't bad).

Date: Sat, 1 Aug 2009 14:30:24 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] OT: Problem with HP-606A linearity

Interesting update. I changed the points where I am setting zero. Instead of setting them at the absolute endpoints, I used points closer to the points where

the error was the worst. I used 600kc instead of 530kc for the low end and 1700kc instead of 1800kc for the high end. It makes the entire scale have a maximum error of 0.8% with each endpoint being out +0.6% and -0.6% respectively. It starts out a little high, goes low briefly, then back to high until nearly the upper end where it crosses back to low again. Not sure if this is the best way to do it, but it does get me closer. I know the R390A's IF transformers are peaked something like this (not at the endpoints, but somewhere near the end). Maybe this is good for calibration procedures as well(?). (Hope this isn't too OT for this reflector...)

Date: Sat, 1 Aug 2009 12:18:56 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Tuning linearity

The deal with the HP-606A sounded like an interesting challenge. I think your solution would be very applicable in many radios other than in a permeability tuned radio such as the R-390A and most vintage car radios. As most know we can adjust the linearity of an R-390A tuning through the compensator disc and it's million tiny screws on the PTO.

If you have ever chased the tuning on a radio that was wildly out of alignment you know that you can get what appears to be "decent" spots. As a youngster I had a Soundesign clock radio that could barely pick up WLS Chicago at night. I decided to "tune it up" and as a bit of a neatness freak throught that those little yellow, red and green screws on the metallic tuning cans should really all be tightened down snug. Then I tried to tune the radio with the two or three tiny little capacitors on the back of the main tuning cap.

After a bunch of misguided tweaking and pure luck I ended up getting WLS at 890 KHz but it was way down at the 540 KHz side of the tuning dial. Sweeping the tuning dial up on the radio I found that it was filled with Morse code, some AM voice, SSB in the 160 meter band and a few international shortwave broadcasters. I borrowed a few of my dad's alligator clips and attached the rather wimpy line cord wrapped FM antenna lead to my bedsprings. I left that radio in that state of mis-tuning until I was out of high school and on my way to college.

Date: Sat, 01 Aug 2009 13:26:22 -0400
From: 2002tii <bmw2002tii@nerdshack.com>

Subject: Re: [R-390] OT: Problem with HP-606A linearity

>Someone suggested that reorienting the dial .....

That was me -- glad it helped! You can probably get the "saddle" in the error curve out if you fiddle some more -- it all depends on how much time you're willing to spend on it. Best regards, Don

---

Date: Sat, 1 Aug 2009 12:56:07 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] OT: Problem with HP-606A linearity

Yes, it was you and a fellow from another list who used to work at HP and seemed to know this was the right way to go. Yes, I do plan to try to at least move the "saddle point" (the plot looks kind of like a sine wave) in an attempt to at least get the dial within spec. If there are other things I can do to reduce the errors, I'd be interested in knowing what they are (I hope it doesn't involve rebending those fins, though).

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Date: Sat, 1 Aug 2009 14:30:24 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] OT: Problem with HP-606A linearity

Interesting update. I changed the points where I am setting zero. Instead of setting them at the absolute endpoints, I used points closer to the points where the error was the worst. I used 600kc instead of 530kc for the low end and 1700kc instead of 1800kc for the high end. It makes the entire scale have a maximum error of 0.8% with each endpoint being out +0.6% and -0.6% respectively. It starts out a little high, goes low briefly, then back to high until nearly the upper end where it crosses back to low again. Not sure if this is the best way to do it, but it does get me closer. I know the R390A's IF transformers are peaked something like this (not at the endpoints, but somewhere near the end). Maybe this is good for calibration procedures as well(?). (Hope this isn't too OT for this reflector...)

Date: Wed, 5 Aug 2009 07:47:23 -0500

From: glwebb@gundluth.org
Subject: Re: [R-390] Series 4 Megger

I haven't used my Biddle Mark III Floor and Footwear Tester for 30 + years. We used to check the conductivity of the floors in the hospital operating rooms. Cyclopropane was still used as an anesthesia gas. You might guess it could be an exlplosive hazzard with electrosurgical units (RF generators used as an electronic scalpel) making lots of sparks. Floors had to have their conductivity measured between two foil covered weighted electrodes 3 feet apart. Acceptable readings: Lower limit 25,000 ohms, upper limit 1,000,000 ohms. Just for the nostalgia I cranked the handle this morning. After all I do own an R-390A.

Gary L Webb NI9V, CBET III, Clinical Engineering Specialist

Date: Wed, 5 Aug 2009 07:54:32 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Series 4 Megger

Yup, the local film producer, the big yellow box, used the same type of thing to check the conductivity of shoes in every building that had silver solutions in it. Didn't want any stray static sparks to affect the light sensitivity of the silver stuff.

Date: Thu, 17 Sep 2009 21:36:07 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] [KA9EGW] s/n 4214 preliminary test results

Not surprised you get signals all over the place.

> .....an N-to-BNC adapter

There is a better way.

> Suggestions? I'm halfway tempted to rip the "C" for an SO239

UGH.. Don't do that. That C connector is part of the antenna relay. here's what you can do: get a twinax connector - good ones can be had for 4 or 5 bucks. Get a BNC chassis mount connector. Ground one pin of the Twinax connector, file the BNC down till you can force it into the cable clamp on the Twinax one, hook the BNC center pin to the other pin of the Twinax and push the BNC into the cable clamp after it's tightened in place. Epoxy and a spot of solder will do also.

I bought the right tap and drill (I think it's 3/8-32 or 5/16-32 thread) to tap the cable clamp ring and have made some very nice adapters equivalent to the military adapter that usually costs some $25 or more now. a right angle BNC

chassis mount connector makes a nice installation and leads the feed coax parallel to the rear of the radio.

Oh, I forgot.. a bit of hot glue or epoxy will hold the two twinax pins in place - you do need this - or they will push back into the connector.. They are normally held in place by the two wires in the twin coax.

I will also make an adapter to set the input transformer balance (68 ohms from the BNC center pin to each of the twinax pins - balanced equal in phase feed.)

One last thought: if you want to be careful about your measurements and be assured that you are in the ball park with the numbers you arrive at for input voltage, you need to consider the loading of the signal generator (it needs 50 ohms at the end of the output cable to deliver the calibrated voltage). You may decide to make an attenuator for the input to the radio, such as 50:1 with 50 ohms and one ohm resistors, or even 100:1 (50 and half ohm) so you can be sure that the input impedance of the radio is not changing the voltage at it's input terminals.

Being moderately sure of RF voltage measurements at the microvolt level to 5 or 10 percent is feasible for us. At one percent, you need all that Agilent or HP can give you. Folk who report sensitivity levels to three decimal points are fooling themselves and most folks who read their reports. NIST can measure RF levels below one percent, but it takes a room full of equipment and half a century of experience.

Date: Wed, 23 Sep 2009 09:15:22 -0400
From: Barry <n4buq@knology.net>
Subject: [R-390] Allen Bradley Potentiometer Numbering Schemes anyone?

Does anyone know where I can find out the value/type of an AB pot I have? It's part of a "new" (to me) Krohn Hite function generator and I have no schematic for it. It's the main frequency control that's getting a bit erratic and would like to look for a possible replacement. All it has are some numbers and letters stamped on the back and I assume some of those indicate the resistance, type, taper, etc., but I don't recognized the scheme. It doesn't have one of of those long Clarostat-style numbers either (e.g. RVxxxxxx, JAxxxxxxx, etc.).

I don't have the numbers with me but I thought if someone could point me to a site where these are defined, I could reference them later today. I do know it is a "Type J" but the other numbers aren't telling me anything.

Date: Tue, 10 Nov 2009 09:19:39 -0500
From: Barry <n4buq@knology.net>
Subject: [R-390] OT: I bought a 'scope

I bought a Tektronix 465M (a.k.a. AN/USM-425(V)1) from eBay (see item #350273674446). When I saw the trace, I figured the image was shot with a shutter speed about 1/250 second and with the sweep time set to 50ms, that would have been about the length of trace shown (approximately 8/100 of the horizontal scale). I copied the picture locally and examined its properties. It turns out the image was shot at 50ms (1/20s) so I looked back at the photos and noticed the delay time "UNCAL" lamp is illuminated. Given a 50ms shutter speed and the trace covering approximately 8/100 of the horizontal scale, then (if I did the calculation correctly), the sweep speed would be about 625ms. I'm not all that familiar with this scope, but I assume the sweep can be slowed to that speed - at least in the 50ms setting. Is this a correct assumption? I ask because I hope the scope is not too broken (if broken at all). Obligatory R390 reference? Well, maybe I'll use it to look at something on an R390[A] one day...

Date: Tue, 10 Nov 2009 10:34:51 -0800
From: "Dan Merz" <mdmerz@verizon.net>
Subject: Re: [R-390] OT: I bought a 'scope

Barry, my 465 DMM manual shows a factor of 2.5 for the uncalibrated range. This would extend the 50 ms to 125 ms. I think you're trying to account for another factor of 5 beyond that. In looking at the photo (which is pretty blurry) I don't know think it's set on 50 ms, looks more like 100 or 200 ms. On my scope 50 ms is above the separator between ms and s ranges, with 50 ms at 9 o'clock and 100 ms and 200 more like 8 o'clock, which is where I think the time/div is set on the auction picture. Dan.

Date: Tue, 10 Nov 2009 15:06:07 -0500
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] OT: I bought a 'scope

I'm not sure if it's a factor of ten in the "good" direction, but there's a button Under the screen if you hit it it stretches the horizontal axis by times ten. It produces Confusing results until you figure out that the button is engaged. My kids come in my shop and hit that button all the time and it can take me a couple of minutes to figure it out Sometimes (and I am no newbie to the 465). The fastest and slowest sweep rates can be chronic problems on any scope and while the Teks Are good they can get out of whack too. I know that calibration is important to many, but far and away the most value in a scope comes not from any absolute calibration but the fact that you can get a picture of a waveform Regardless of whether the scales are right or not.

Date: Tue, 10 Nov 2009 15:15:52 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] OT: I bought a 'scope

I'm not sure, but it appears there are two indicators at work on the delayed sweep settings rotary switch (one for channel A and one for channel B). It appears the B channel is set to 50ms and the A channel is set to 500ms. Someone mentioned that it's also apparent that none of the horizontal display buttons are selected and, in this condition, it may default to A channel. If so, then a 500ms sweep time may be much more in line with what's shown (given a 50ms shutter speed). I suppose I'll find out in a week or so... Thanks for the advice guys.

Date: Tue, 10 Nov 2009 17:18:56 -0500 (EST)
From: larrys@teamlarry.com (Larry Snyder)
Subject: Re: [R-390] OT: I bought a 'scope

> Someone mentioned that it's also apparent that none of the horizontal
> display buttons are selected and, in this condition, it may default to
> A channel. If so, then a 500ms sweep time may be much more in line with
> what's shown (given a 50ms shutter speed).

That would've been me. I still think you're going to be ok. There's a Y group out there (TekScopes) populated by quite a few former Tek folks. It's a great resource, and very helpful. There's a copy of the USAF TO on the edebris bama mirror. Lots of good stuff in there. Once you have it in hand, feel free to yell if you have Q's.

Date: Wed, 2 Dec 2009 15:52:02 +0000 (GMT)
From: Robin Filby <robin.filby@yahoo.co.uk>
Subject: [R-390] HP-410C Original manual.

Does anybody have an original manual for a HP-410C VTVM which they would wish to sell. Or does anybody know of a source for originals (NOT CD copies) please. Thanks in advance to everybody.

Date: Wed, 02 Dec 2009 17:58:13 +0100
From: Heinz Breuer DH2FA <dh2fa@darc.de>
Subject: Re: [R-390] HP-410C Original manual.

Be careful when buying a HP-410 C manual. The HP-410C was built over a twenty year period and changed from a tube to solid state. There are at least 3 different schematics. Be sure to get a manual that matches your serial number prefix.

Date: Wed, 02 Dec 2009 17:21:55 -0600
From: Robert Nickels <ranickel@comcast.net>
Subject: Re: [R-390] HP-410C Original manual.

Heinz' advice is sound, I've found major differences that aren't reflected in the manual backdating change sheets. I'd suggest that you get your serial number and then compare with the copies at
http://www.hparchive.com/hp_equipment.htm
But check the backdating details in Appendix C rather than relying on the cover sheet, which for my s/n block was never updated.

Date: Mon, 11 Jan 2010 10:16:39 -0500
From: Barry <n4buq@knology.net>
Subject: [R-390] OT: Wavetek function generators

Looking for comments on Wavetek function generators. Are they a relatevely good build quality, etc. Local fellow has an older one (just a generator, not a sweeper) similar in build to the following:

http://www.testelectronics.com/used/wavetek114.htm

IIRC, the one he has is good through 100kc. I bought another generator a few months ago, but not really impressed with it and am looking for another that might be a better generator. Yes, I know if I wanted to spend a lot of cash, I could get a generator with more "stuff", but for $25 this one might be good enough for general use. I bought a really nice General Radio capacitor analyzer from the fellow and among the other stuff he had, this generator caught my attention but wanted to know more about it before getting it.

Date: Mon, 11 Jan 2010 23:27:46 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] OT: Wavetek function generators

Most of their stuff is decent but nothing to get excited about -- maybe a half notch better than Leader and B&K/Dynascan, or maybe not. The 114 and its non-sweep brethren are basic function generators familiar to thousands of engineering students (their primary mission was as low-cost generators for university engineering and science labs).

What do you want to use it for? As a source of audio signals to feed into circuits you are building or to modulate an RF generator, it should do fine. If

you hope to feed an IF or HF signal into a radio for testing and alignment, you will find that *all* general-purpose generators have way too much FM and drift to make you very happy.

For that, you need a proper RF generator, where money has been spent on careful frequency control (particularly the mechanical and thermal design). You'd like your RF generator to exhibit stability and freedom from drift that are better than the VFO in the radio you are working on.

General-purpose function generators are several orders of magnitude worse than an R-390/A PTO in this regard.

Date: Thu, 18 Feb 2010 20:27:08 -0600
From: "Barry" <n4buq@knology.net>
Subject: [R-390] HP 8640B Question

I think some folks on this list have HP 8640Bs so I thought I might indulge those fellas a second. I think I understand that there's a rather delicate gear that frequently breaks in these units. When that occurs, what are the symptoms?

Is this, by any chance, directly related to the frequency change knob? In other words, if this gear breaks completely, would the frequency change knob work at all? Also, I seem to recall that someone made some replacement gears. Was it someone on this list? Thanks in advance for any info on this,

---

Date: Thu, 18 Feb 2010 18:50:40 -0800
From: "Scott Overstreet" <scott@becklawfirm.com>
Subject: Re: [R-390] HP 8640B Question

First, Barry---open it up, all the gears are in plain site. Now, all-----By all means yes---- If you know where replacement HP 8640B gears can be had --please tell us all! I for one have an 8640B with wired together gears and I love it! The 8640B
is a terrific instrument and I'd like to keep mine running as long as I am runable.

Date: Thu, 18 Feb 2010 22:27:32 -0500

From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] HP 8640B Question

There has been a LOT of discussion about these nylon/delrin (?) gear on the Test Equipment (qth) list. Apparently someone is "trying" to get a "good" one so that BETTER ones can be made. You may want to join and search the archives, or just search that lists archives. One site, <http://jvgavila.com/hp8640b.htm>, shows the split gear clearly. This causes the gear assembly to jump a tooth or two,, no doubt causing it to NOT be where it is supposed to be! Apparently, this is true of similar numbered instruments.

Date: Thu, 18 Feb 2010 21:48:44 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] HP 8640B Question

It may very well have been on the Test Equipment list that I saw something about the replacement gears. Yes, I did see the pics on Jose's site. There's one up for bid on eBay and I think it's just in need of gear work.

Date: Fri, 19 Feb 2010 02:26:21 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP 8640B Question

There are quite a number of Nylon gears, all readily apparent when you take one apart, and at least two basic failure modes. The collars split, which means you can't tighten the gear on the shaft, and the large gears shrink (and some warp) over time so they skip teeth. Once the teeth skip, you either park it and look for a new gear, or ruin the gears by trying to use it and ruining the teeth. Any 8640B on eBay that is not guaranteed by an upstanding seller to be working properly will invariably have ruined teeth on several gears, and usually broken and slipping collars, as well. I have a pile of them here that folks I know bought on eBay hoping they had good gears, and not one of them works due to gear failures -- probably $3000 worth of eBay mistakes in one pile. Some of them have other problems, as well.

Personally, I would not risk buying any 8640B I had not personally seen and played with. I have repaired several gears with split collars, by machining new brass collars and attaching them to the existing Nylon gear flanges. I have threatened to machine new large gears out of brass, but have not done so as yet. Maybe when I retire....

Date: Fri, 19 Feb 2010 07:14:42 -0600
From: Jerry K <w5kp@hughes.net>
Subject: Re: [R-390] HP 8640B Question

I went through two 8640b's several years back and ended up with the same gear and output attenuator problems as everybody else before I threw up my hands and bought a clean used HP 8656B (from a defunct New York TV studio, no less), and it has been the best test equipment money I've ever spent. Even though it's relatively old technology, it's like stepping up from a Yugo to a Lexus for receiver work when compared to the 8640B. I especially like being able to quickly program sets of IF and RF alignment freqs and output levels for a bunch of different receiver bands, and recall any of them instantly with a couple of button punches during an alignment procedure. That is a HUGE time saver for bench work on R-390A's and such.

I hate cranking signal generator knobs. 8656B's aren't what I would call expensive, but aren't being given away, either--maybe $400-$600 for a decent one with a money-back return privilege, admittedly not pocket change but worth every penny. The best part is what they DON'T have, which is nylon and plastic parts that are absolutely guaranteed to shrink, crumble, and self-destruct with age. I applaud efforts to resurrect piles of defunct 8640B's with new replacement metal gear trains, but for lots of reasons (speed/ease of use, programmable memory, and a much nicer display) I personally would never go back to an 8640B again even if somebody gave me one. There are too many better affordable options out there.

Date: Fri, 19 Feb 2010 08:08:23 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] HP 8640B Question

Although it doesn't go down below 10MHz, I would have liked to have had this one: eBay # 320473707073 It appears to be in extremely nice condition but I was at work and I don't bid on eBay at work. I bid on a broken 8640B but someone else has outbid me and after reading some of this, I'm going to let someone else have it. I have an HP-606A, but not really thrilled with it. It is pretty hard to get it calibrated and still don't have it quite right and I've pretty much set my sights on a synthesized generator. Maybe one day I'll find one I can "afford"...

Date: Fri, 19 Feb 2010 10:18:06 -0600
From: Robert Nickels <ranickel@comcast.net>
Subject: Re: [R-390] HP 8640B Question

Gotta chime in with Jerry on that! My 8656B came about when analog cellphone factories had to re-tool, and I suspect there are many off-lease and available now that everything has gone digital. Simply put, they are fantastic. I've cross-checked the attenuated RF output and find it's dead-on, and there's nothing like being able to generate whatever frequency you want at any amplitude up to 1 volt with AM or FM modulation in 1% increments and know it's exactly what it's supposed to be - 100khz through 990 mhz. Another nice plus is the protection
circuitry on the RF output, which works very well (don't ask how I know this!)

Manual: some have knocked the purity of the output but I've never found it to be an issue for what I use an RF generator for. And the 8640 it replaced also was properly recycled - I swapped it for another R-390A ;-)

Date: Fri, 19 Feb 2010 08:33:05 -0800 (PST)
From: Michael OBrien <mikobrien@yahoo.com>
Subject: Re: [R-390] HP 8640B Question

How does the Fluke 6060A/AN compare to the HP 8656B I have one (calibrated 2008) and 2 8640B's One of them was bought off ebay from a guy who does a lot of work on them Now I am a little nervous about them

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Date: Fri, 19 Feb 2010 16:56:47 +0000 (UTC)
From: r.tetrault@comcast.net
Subject: Re: [R-390] HP 8640B Question

Would gladly swap my Fluke 6060 for an 8640B, even though the Fluke is fully GPIB'd (and is actually setup for that in my rack). Cleaner, better attenuator. Nice knobs... personal preference

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Date: Fri, 19 Feb 2010 14:35:37 -0500
From: k2cby <k2cby@optonline.net>
Subject: [R-390] HP-8640B Question OT

I had the same problem with an 8640B a few of years ago. With a bit of light machine work it is possible to adapt a couple of commercially available brass gears so that they will replace the broken delrin gear. Alternatively, if the original gear isn't too badly broken, you can ream it out so that it again fits around the brass hub and cement it to the hub with slow-drying (not "5 Minute") 2-part epoxy. I will try to gather my notes over the next few days and forward copies to anyone who e-mails me with a request. /Miles, K2CBY

Date: Fri, 19 Feb 2010 17:35:41 -0500

From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP 8640B Question

The 8656A/B and 8657B are great generators, but like all synthesized generators, their phase noise and spectral purity are orders of magnitude worse than the 8640B (harmonics specified at only >30 dB down!). That's why the 8640B is beloved by engineers the world over -- stability similar to a synthesizer but (still, today) world-class signal purity from that wonderful cavity resonator. Best regards, Don

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Date: Fri, 19 Feb 2010 19:05:10 -0600
From: Jerry K <w5kp@hughes.net>
Subject: Re: [R-390] HP 8640B Question

True--as long as they're still working. Hard to believe they are that beloved worldwide, though, since those things have been dropping like flies from the same ailment for years now and nobody has bothered (or paid the $) to come up with a fix for them--like a new set of replacement gears. You can bet your bippy that Agilent isn't the least bit interested in providing a cheap, sensible fix for dying 8640B's--they'd be tickled silly if they ALL ended up in a landfill. I doubt spectral purity is all that critical to running an alignment signal through a 50-year-old vacuum tube receiver anyway, which is 95% of what I do with my generators. Heck, I'm happy to just FIND a signal at the other end of an RF deck or an IF strip sometimes, spectrally pure or not! :)

Date: Sat, 20 Feb 2010 10:46:03 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] HP 8640B Question

I'm curious about something. Many of the 8640Bs I see display all zeros - apparently on start-up. Some of the ads state the display simply shows all zeros - apparently even when the frequency change knob is exercised. Is this a common? Is there something one has to do to get the frequency to display?

Date: Sat, 20 Feb 2010 12:13:06 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] HP 8640B

Question Barry - Not owning one, nor having the manual(s), I couldn't tell you. I have older HP gear. A 410B and a 312A. One is analog all the way, the other uses a nixie tube display that always comes up displaying the last place it was

at. The 8640Bs were all together something different. I suspect that the issues regarding the gears was some "management" decision to do things on the cheap. Lord only knows what else they did that way.

Date: Sat, 20 Feb 2010 09:29:08 -0800
From: Jeff Anderson <jca1955@sbcglobal.net>
Subject: Re: [R-390] HP 8640B Question

I know of a couple of reasons why an 8640B might be showing all zeros...

The first is very simple. There's a switch on the back panel that allows the user to select between an external frequency reference and the internal frequency reference. If it's in the Ext. Ref. position, and there's no reference attached, you can get an all-zero display.

An all-zero display can also be caused by moisture in the oscillator cavity (if I'm remembering this correctly). Apparently, this can lower the Q to such an extent that the oscillator no longer oscillates (for example, if the display goes to zero while you're changing frequency, this might be the cause). The "fix" for this involves pulling out the cavity assembly, removing a plug on it, and then putting the assembly into an oven for a period of time to out-gas the moisture.

Date: Sat, 20 Feb 2010 11:38:02 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] HP 8640B Question

Nope... the display should show the current frequency being generated.....if it's all zero's I would say there is a problem. Mine comes up cold on whatever frequency I left it on plus or minus the warm-up drift. If the lock button is depressed it will go straight to a flashing display indicating it is out of lock which is common while warming up. Even then it's not all zeros.

Date: Sat, 20 Feb 2010 13:41:50 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP 8640B Question

If they are treated carefully (proper mechanical maintenance and no manhandling of the controls) and not subject to temperature extremes, they are not so failure prone. I assume that ome nylon gears were made better than others (better and worse days at the gear factory), so some are inherently less failure prone. Plus, HP made an enormous number of 8640Bs, so even large attrition leaves lots of them in service.

The problem with a fix is that since there are so many of them, professional/industrial users can just get a working unit from a reputable equipment vendor. The broken ones go to hobbyists, who won't pay $200 for parts to fix them.

>I doubt spectral purity is all that critical.....

No argument there. For those of us who use a generator to aid in designing low-noise, low-distortion amplifiers and mixers, it can make quite a difference.

Date: Sat, 20 Feb 2010 10:50:19 -0800 (PST)
From: Kim Herron <kim.herron@sbcglobal.net>
Subject: Re: [R-390] HP 8640B Question

The display will come up all zeros when the internal/external switch is set to external. Most people checking these things out don't have a CLUE how they get used, so they don't realize the switch even exists.? You can also have a counter standard that is not working (internal efect) and the counter won't work in that case either.? It pays to familiarize yourself with this piece (I own two) before you buy one and LOOK at the photos to determine is the thing is set up to work right.

Date: Sat, 20 Feb 2010 13:20:10 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] HP 8640B Question

I thought that seeing so many of them with that "symptom", it might mean that the user simply did not know much about them. Many of the ads state as much. I've seen a couple of them at hamfests, but haven't owned or used one yet. I hope to soon, though.

Date: Sat, 20 Feb 2010 13:27:14 -0600
From: Mahlon Haunschild <mahlonhaunschild@cox.net>
Subject: Re: [R-390] HP 8640B Question

Any 8640B counter will display all zeroes if its input is inadvertently switched to the front panel external counter input connector (this is easily overlooked; I've done it myself several times). Were you thinking of something else? By the way... while writing this I turned around to my equipment rack and switched on my two 8640Bs which I hadn't turned on in a very long time (at least a year). The freq. displays are within .005% of where I left them and the PLLs lock right up as they should. I'll keep 'em.

Date: Sat, 20 Feb 2010 14:34:31 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] HP 8640B Question

Having looked on that Evil Place, I see several up for auction with a bunch of pictures. One in particular shows zeroes across the display AND the switch on the rear is set to INT. I wouldn't place a bid under any circumstances!

Date: Sat, 20 Feb 2010 16:07:59 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP 8640B Question

>One in particular shows zeroes across the display AND the switch on the
>rear is set to INT.

The relevant INT/EXT switch is on the front -- it selects the input to the counter. The INT/EXT switch on the back determines whether the 8640 looks to an internal or external oscillator for its time base. That said, most 8640s I've seen that read all zeros don't do so because the counter input is set to EXT, but rather because someone once used them to count external signals and fried the counter. That is the single most common 8640 problem I've seen. So much so that I advise folks NEVER to use the 8640's external counter. It comes with a BNC cap -- leave it there. Note that the military Option 323 units do not have an external counter input, for this very reason. Best regards, Don

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Date: Sat, 20 Feb 2010 16:41:30 -0600
From: Mahlon Haunschild <mahlonhaunschild@cox.net>
Subject: Re: [R-390] HP 8640B Question

Indeed, that ext. counter input is spec'd from 100 mVrms to 1.3Vrms. That last one is very clearly marked as a "may-not-exceed" in the service manual. Also, its Zin is 50 ohms, another way to get things messed up. It leaves the cap on or it gets hosed!

Date: Sun, 21 Feb 2010 02:55:05 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP 8640B Question

Re: RF leakage from 8640Bs: I've lost track of who brought up leakage, but the 8640B specs say: "Leakage: (With all unused outputs terminated properly.) Leakage limits are below those specified in MIL-I-6181D. Furthermore, less than 3 uV is induced in a 2-turn, 1-inch diameter loop 1 inch away from any surface and measured into a 50 ohm receiver. This permits sensitivity measurements to at least < 0.03 uV in a shielded system." For reference, 3 uV is about S5 on a receiver with a 50 ohm input (and a calibrated S-meter, which most aren't). That MIL spec has been superseded by MIL-STD-461:

http://www.everyspec.com/MIL-STD/MIL-STD+(0300+-+0499)/MIL-STD-461F_19035/

The testing methods for MIL-STD-461 are detailed in MIL-STD-462:
http://www.everyspec.com/MIL-STD/MIL-STD+(0300+-+0499)/MIL_STD_462d_1322/

The 8640B is not exactly Tempest-certifiable, but very respectable. If all outputs are properly terminated and you can hear it on a radio, the antenna of which doesn't come any closer than 6' to the 8640B, it's not working to spec.

Date: Sun, 21 Feb 2010 16:21:53 -0800
From: Robert Jefferis <jefferis@antelecom.net>
Subject: [Collins] Interpretation of 30L-1 manual, sec. 4.7

This afternoon I was reading 30L-1 manuals to clear memory cobwebs before adjusting a unit. I happen to have the 5th and 8th editions on hand. When I got to the "TUNE METER ADJUSTMENT", section 4.7.g., I noted what I feel is a confusion factor. Once you have increased exciter drive to the point of distortion onset, you should see a minimum of 450 V p-p on the scope (if you use this method). The 450 V p-p minimum output voltage requirement is clearly associated with the peaks of the 2-tone RF waveform envelope. This would correspond to a minimum output requirement of 506 Watts into 50 Ohms.

Since this check is done with 2-tone excitation, why would the RMS voltage, 160 VRMS (actually 159 if you run the numbers corresponding to 450 V p-p) be stated in the manual? Since my scope can only handle 400 V p-p without an external calibrated attenuator, I don't use the measurement method called for. Instead, I place directional couplers in the input and output lines of the amplifier to create an X-Y display on the scope. I can get much more reliable detection of distortion onset. I also place a wattmeter in the amp output line. My interpretation of all this is that the minimum power output with 2-tone excitation at distortion onset, as indicated by a wattmeter should be 506/2=206 Watts.

Have I missed something? Yes, I know that the Tuning Indicator can be problematic, but IMO, it needs to be set up correctly, regardless of how you tune the amp when in service.

Date: Sun, 21 Feb 2010 19:15:48 -0600
From: "Dr. Gerald N. Johnson" <geraldj@weather.net>
Subject: Re: [Collins] Interpretation of 30L-1 manual, sec. 4.7

.....I noted what I feel is a confusion.....

The envelope is not constant at that peak value and that affects the other instruments.

.....why would the RMS voltage, 160 VRMS .....

Because with a peak reading, calibrated in RMS, voltmeter such as the HP410B typically specified for such a measurement, will read the peak, not the heating power(RMS) or the average. And that matches the peak to peak value on the scope.

> Since my scope can only handle 400 V p-p .....

Depends. A peak reading meter should show 506 watts. An average reading meter will show less, but I think more than half. Probably about 70.7% of the peak since the envelope is a sine squared waveform.

Date: Sun, 21 Feb 2010 20:57:40 -0800
From: Robert Jefferis <jefferis@antelecom.net>
Subject: Re: [Collins] Interpretation of 30L-1 manual, sec. 4.7

Yes, the instrument used is quite important:

1. OK, sure, if you have one of the "T" coax adapters to use with the ubiquitous HP AC probe used on the 410B and 410C meters, the reading is likely to be close to 159V. I guess this could justify the presence of the reference in the manual, even if they didn't mention a peak reading RF probe connection. Although, I believe that one of these probes will read a bit lower than 159V.

2. I agree, a good peak reading wattmeter will should read 506 Watts.

3. However, an average reading (actually, RMS - a misnomer) wattmeter like a Bird 43 or thermal (heating value) wattmeter should read half the power, i.e., 253 Watts. I just verified this with a pSpice simulation. Lazy man's way of calculating the result. The math is too tedious given the cyclic change of phase

relation between baseband exciting sources and, you have to sort out an appropriate integration period.

Date: Tue, 20 Apr 2010 09:38:05 -0400
From: Barry <n4buq@knology.net>
Subject: [R-390] HP-8601A?

Anyone have experience with an HP-8601A, particularly for aligning R390s, etc? It seems like a decent generator as it covers the entire spectrum needed for these radios and I *think* it is fairly leakproof. Just wondering if there are any particularly bad things about them that would make them not a good choice for this application.

Date: Tue, 20 Apr 2010 15:11:19 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP-8601A?

It's a useful piece of equipment, but IMO clearly in the "don't pay real money for it" class. I've seen a few go for $200 or more at auction, which I think is way too high -- you can get an OK 8640B for that money if you look. If you find an 8601A that works for $50-75, however, that's another story. My experience is based on buying three working units with relatively minor problems for $40, and fixing them up for friends (during which process I learned more than I really wanted to know about them). They are not easy to work on.

Stability is decent. I never measured leakage, but I never noticed any problem in this regard. The 8601A has a fair degree of line hum (mostly 120 Hz) that appears as FM on the RF output. I found it was virtually impossible to remove. If having a sweep generator is one of the reasons for considering the 8601A, its sweep mode is pretty clunky. The calibrated sweep widths (in symmetical sweep mode) only go down to 100 kHz above 11 MHz, and only to 10 kHz below 11 MHz, so you're left to use the vernier and guess how much sweep you're using
for most radio alignment tasks.

Like many RF generators, the attenuator is not well protected against overload, so you need to be sure nobody ever transmitted into it (which, for some reason, is much more common than I'd expect). My advice for anybody who may ever hook up a transceiver to a signal generator is to leave a 20 dB coaxial pad permanently installed on the generator output.

Date: Sat, 24 Apr 2010 22:26:24 -0400

From: jrfke5ri@aol.com
Subject: Re: [R-390] Nixie Tube Freq Readout

Many years ago Heathkit made a tunnel dipper. It was a real dog compared to Millen tube type meters. I still have the darn thing and it works, but I don't use it. Perhaps I should offer it on e-bay.

Date: Sun, 25 Apr 2010 15:01:15 -0700 (PDT)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] Nixie Tube Freq Readout

Methinks the term "dog" to be overly complimentary. I also have a Heathkit Tunnel Dipper and note its many problems. Chief among these is its tendency to refuse to oscillate at all in the lower 1/3 of its dial range, and an extremely touchy meter seting adjustment. It really is much better, largely confined to use, even, as an absorption wavemeter.

Date: Mon, 26 Apr 2010 01:30:11 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Nixie Tube Freq Readout

Really? The only three I ever liked were the '50s-'60s VTVM (V-7, V-7A, IM-11, IM-18, etc.) -- after you drilled as few cooling holes in the case; the DX-100 (the original, not the "B"); and the W-5M audio amp (before they changed the output transformer). Everything else I ever worked with or on could be described as "nearly serviceable" at best, but always full of gratch. I've heard that some of the tube linears were OK, but I've never played with one.

Date: Sat, 24 Jul 2010 20:42:01 -0600
From: Transmaster <22hornet@gmail.com>
Subject: Re: [R-390] R-388?

<snip>

You may have run into or own one of the many transmitter/Receiver BC-22X-XX calibrators which were used in the 1940's and early 1950's. the one I have is a BC-221-AL The R388 receivers where very accurate frequency standards in there own right and where used to calibrate the transmitters they worked with. This one radio made the all of these HF
calibrators redundant. By the way if you run into one of these old calibrator units in good working condition purchase it they are very handy to have went working on old brontosaurus transmitters.

Date: Thu, 5 Aug 2010 18:34:12 -0400 (EDT)
From: frankshughes@aim.com
Subject: [R-390] HP spectrum analyzer question

I would like to obtain an HP spectrum analyzer to use on my R-390A and R-390, plus whatever other ancient boatanchor devices come to my workbench in the future. Trouble is, unlike the choice for a generator (8640B), there are too many HP Spectrum analyzers on the E-place for me to pick from. I can eliminate most just by the frequency spread, but am missing the knowledge and experience as to which HP might be a relatively trouble-free design. What do you like?

Date: Thu, 5 Aug 2010 17:43:55 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] HP spectrum analyzer question

The better way...and more inexpensive way now days is to pick up an inexpensive SDR kit like the SoftRock. They sell them for just that use. (455Khz IF) You plug the thing into your computer USB port and sound card input and with some free software can get the bandscope functionality. I think the kits are $40 or 50 and your time to build it and get it up and running. It's pretty cool. Side benefit it can be used to demodulate SSB, RTTY etc...

Date: Thu, 05 Aug 2010 22:06:28 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP spectrum analyzer question

For that sort of thing, my favorite is the 3585A or B. (Get an A -- B's are still unnecessarily expensive, and don't perform any better.) You can not only look at the radio's IF, you can hook it to your antenna and watch whole bands (or more) at once. Frankly, with the abysmal content on the bands these days (broadcast, ham, everything), I get a lot more pleasure from watching the bands on the SA than listening to them. Your first look at a local AM IBOC station will gross you out.

Date: Fri, 6 Aug 2010 02:23:20 +0000
From: <kirklandb@sympatico.ca>
Subject: Re: [R-390] HP spectrum analyzer question

HP 8560 series is a higher end spec A compared to the 8590 series. Going back both hand green phosphorous screens. A common problem for both was the screen would fade/die. Hate to pay $500 - $2K for a analyzer and have the screen die. Also, if someone left it on too long, the phosphorous would be

burned in. I would suggest making a simple one. You can fashion a power detector either with a diode or go with one of the Analog Devices log power detectors, ie. like that used in the W7ZOI spectrum analyzer. I wouldn't buy one unless you can really check it out. Attenuators could be shot. I had an older model and the nylon gears had split (controlled the RBW, VBW, rates). I confess, I have a R&S 28 GHz spect A that I use at 500 kHz. It is a 2 story unit and runs on DOS but was "free".

Date: Thu, 5 Aug 2010 23:38:41 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] HP spectrum analyzer question

Cecil no doubt assumed that you want to see the spectrum near the point a receiver you have is tuned to. The SoftRock thing, as I understand what he posted, does just that, though there is some confusion in my mind. For lots more info Google "SoftRock SDR Kit". From what I read, the SoftRock-40 was a 40 meter receiver, not meant for 455 kc, and is now sold out. The SoftRock 5 follow-on project is now open for orders and appears to have options to accept signals in different ham bands. However, you may have meant to examine signals at most any HF frequency (or even higher) and see what the signals in that vicinity are. For example, the output of an SSB transmitter operating on 20 meters. For this use, the HP spectrum analyzers that folks have suggested will more suit the purpose. I look forward to more advice on the list.

Date: Fri, 6 Aug 2010 07:35:04 -0400
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] HP spectrum analyzer question

It's a dessert topping AND a floor wax! The issue is, the HP Spectrum analyzers were not designed to be radios with spectrum displays. The radios with spectrum displays were not designed to be HP Spectrum analyzers. They both have similar to identical functional components, and they can sometimes be pressed to do each other's jobs, but they were designed with entirely different user communities in mind. I do know people who use their radios as spectrum analyzers. And I also know people who use their spectrum analyzers as radios. But IMHO this is far from optimal, reminds me of using a butter knife as a screwdriver, and a screwdriver for a butter knife. One issue is that superhet radios really have a dynamic range at the IF level of maybe 30 dB before they

really begin compromising performance. That's not too bad ifyou're using it as a radio and is why superhets almost universally have AGC. But it sucks if you're using it (for many purposes) as a spectrum analyzer.

Date: Fri, 06 Aug 2010 09:28:57 -0500
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] HP spectrum analyzer question

The Heath SB 620 works well and is usually around $100 when you can find them. You are limited to a smaller range when using 455kHz and I can't remember it now. Maybe 500 kHz.

p.s. I'm also using a HP 3586B as a receiver.

Date: Thu, 12 Aug 2010 21:28:18 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] HP Spectrum Analyzer

A HP 3585A is certainly the way to go if one has a spare kilo buck! In the more affordable range is the HP 141 series. They are plentiful and can be found complete and working in the $400 range. But shipping can be high. There are a number of others you might also want to consider. The HP 181 while not as prevalent as the 141 series if often reasonably priced. I think you should also consider units made by Tektronix. They have the 491 and 492 stand alone units. They also have a 7L12 plug in for the 7000 series of scopes. The 7000 series are even bigger BA?s than the R390 but are built extremely well and are cheap, cheap, cheap. I got a 7904 500MHz mainframe with four good working plug-ins for $200. Although the 7L12 plug in hovers in the $500 range. Two more points. My observation is that on epay a particular type test equipment seems to come in spurts and prices vary wildly. Secondly take a long hard look at what you want to do. It is easy to get lots of money invested on an obscure idea. That?s how I got seven HP 3568B selective level volt meters. Three work OK, two need small repairs and two are only good for parts (but were supposed to be working). I got them for less that the dealers wanted but ended up spending close to $1K over a two year period. But in reality I will only end up using two or three at the most. It is very easy to get carried away on the minor stuff.

Date: Sat, 14 Aug 2010 22:04:52 -0400
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP Spectrum Analyzer

One shouldn't have to pay $1000 for a 3585A, although as Perry noted, asking prices vary wildly. One thing to think about carefully when buying a SA is the minimum IF bandwidth. A lot of analyzers don't have the narrow bandwidth IFs you need to clearly separate signals that are near each other. For scanning a whole band, 100-300 Hz is best, and 1 kHz will do in a pinch. For looking at 20 kHz of spectrum, 10-30 Hz is much better. And for looking at one signal in a 2-10 kHz bandwidth, 3 Hz is very useful. Also, older analyzers are often not well calibrated as to frequency, so you end up spending a lot of time and energy doing that manually with a generator and counter. The 3585 reads accurately to 0.1 Hz. It also has a tracking generator, which is invaluable for design, or characterizing filters, or any number of other things. It's all about what you need it to do. And while you're thinking about that, also try to imagine things you might be able to do with a SA that you haven't thought about yet, and what cababilities those would require.

With any of them, you want a CRT that doesn't have a million miles on it. The newer analyzers typically keep track of on hours and on-off cycles. It pays to familiarize oneself with the operators' and service manuals of the models under consideration, so one can give the seller step-by-step instructions to get this information and run basic diagnostics.

Date: Sun, 15 Aug 2010 12:56:04 -0400 (EDT)
From: frankshughes@aim.com
Subject: [R-390] Spectrum Analyzer status

Thanks for all the advice and tips, very informative. The Spectrum Analyzer arrived! Now I just have to learn how to use it. (the fun part) Thanks to KZ5AW, I bought one of these: http://www.amtronix.com/e8285a.htm

I was originally trying to buy a 141T that was being offered locally (no shipping costs or damage), but someone beat me to it. So the E8285A was plan "B" The unit is calibrated and all tuned up, ready to go, so no complaints. I subsequently joined the Yahoo "hp_agilent_equipment" group for old equipment, after looking around my shack and realizing that there are about equal amounts of old HP and old Collins gear. What is it about Collins R-390A & R-390's that goes so well with vintage HP equipment? They all seem to go together, somehow.

Date: Sun, 9 Jan 2011 15:20:27 -0500
From: Barry <n4buq@knology.net>
Subject: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

Anyone on the list have any experience with an HP8654A/8655A/11710B combination? The reason I ask is I have an 8654A/8655A and am thinking of getting the 11710B to get the lower parts of the HF range and was wondering if I'd be better off with this or getting an 8640B. The combo will give me a greater low end (down to 10kc) and the footprint is a bit smaller, but wondering if there are any other (dis)advantages. Basically, I'm tired of lugging the 606A up to the bench... :)

Date: Sun, 09 Jan 2011 15:55:44 -0500
From: Al Parker <anchor@ec.rr.com>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

I've had that setup for 4-5 yrs, set up & available in my "upstairs" shack/shop. I'm afraid I haven't used it as much as I'd like, haven't done much fixing in that spot lately. IIRC, the "tuning rate" is a bit fast in some instances, but the lock-on feature is really neat. The small footprint is a big asset. The overall freq. range is great, I was worried about it's operation in the HF area, but it seems OK. Not great for doing the alignment of a multi-band HF rcvr with lots of back & forth freq. work, but probably easier at that than a URM-25 ;-) If you can think of any specific questions I'll play with it a bit & see what we learn.

Date: Sun, 09 Jan 2011 17:08:46 -0600
From: n4buq <n4buq@knology.net>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

Yes, aligning a set like the R390A where one might have to switch between the converter and the straight output because the frequencies are +/- the 10mgc point might be a pain and I wondered about that.

As for other questions, I assume the counter must be also switched back and forth between the two outputs so there's double the work when going above/below the 10mgc point as well.

I do like the smaller footprint, though, as I have a fairly small work area.

Date: Sun, 09 Jan 2011 20:02:45 -0500
From: Al Parker <anchor@ec.rr.com>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

No, IIRC, you don't need to do any switching of the counter, it's cabled in at the rear. I do have manuals for all 3 units (I think), so if you want any of that info I'll get a look.

Date: Sun, 09 Jan 2011 20:11:44 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

Well, the 8654 (A or B) was never intended to be an 8640B-class generator. In terms of signal purity, it may be the dirtiest RF generator HP ever made, including the earliest synthesized models. Fine for basic alignment, but not really useful for twin-tone IM measurements or anything fancier.

These days, one would typically use it with a counter -- but be careful, the auxiliary output on the rear panel is not well isolated, and any crap that comes out the counter's input (not at all unusual) can end up on the main output, further compromising signal purity. I suggest using a 20 dB pad between the rear panel output and any counter to minimize this.

The 11710B works reasonably well (I use them with 8640Bs to get below 400 kHz), but the internal crystal oscillators are a bit noisy so the mixed output has a poorer noise floor than the 8640B and also has more phase noise, if you are doing anything where phase noise is a concern.

As Al noted, the "B" version makes a voltage control input available on the back panel. If you have the HP 8655A reference/phase detector (or build something similar -- the originals were rare even in their own day), you can use this input to lock the 8654B to an external standard, at the price of quantized frequency steps.

Date: Sun, 9 Jan 2011 22:21:38 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

Okay, Don. I'm just doing simple IF/RF alignment so I guess it's probably good enough for my purposes. The 8655A is the counter and not sure how much extra noise it would add to the mix.

Still might just go with an 8640B. The 11710Bs cost almost as much as a good 8640B.

Date: Sun, 9 Jan 2011 22:28:37 -0600

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

Make sure the 8640B has a fully operating gear train. The plastic gears are a weak spot in these generators. I'm not aware of spares either. One that works is a nice machine...

I have one and a 606A...

Date: Sun, 09 Jan 2011 23:41:58 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

>The 11710Bs cost almost as much as a good 8640B.

Timing. I bought several for less than $100 each a year or so ago from a guy who had a pile of NIB ones on eBay. They appeared to be selling well -- he upped the BIN price after a while. I guess he must have run out. I see there are a number of 8655As for sale, so they must not have been as rare as I remember them being. But the asking prices are more than I'd pay for an 8640B. So if you sell your 8654A and 8655A, you may well have enough to buy a nice 8640B.

Date: Sun, 9 Jan 2011 21:46:12 -0700 (GMT-07:00)
From: "Richard W. Solomon" <w1ksz@earthlink.net>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

Tucker had a truckload of them, between them and e-Bay, there were a lot of them. I got one, NIB, for about $50. I was not too impressed with the design.

Date: Mon, 10 Jan 2011 00:26:43 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP-8640B vs. HP-8654A/8655A/11710B

It's just a 50 MHz oscillator, a mixer, a one-transistor post-mixer amp, and some filtering and switching (there are also 5 MHz and 1 MHz outputs divided down from the 50 MHz oscillator, but they are not pertinent to the primary function of the unit). Their big claim to fame was that the conversion gain/loss was within 1 dB over the full frequency range, so you can rely on the output level

set by the 8640B. Not always an easy trick with a mixer output covering 10 kHz to 11 MHz and input levels from 0 dBm to -110 dBm.

I reduced the amplifier noise a little by replacing the single-transistor RF amp with a two-transistor feedback amp in one of mine, but that by itself made very little difference -- the noise added by the 11710B is mostly from the 50 MHz oscillator, as I mentioned in a previous message. I replaced the oscillator in the one I modified with 10 MHz from the shop 10 MHz distribution amp (which can be fed by a GPSDO or a Rb source) and a 5x multiplier, with appropriate filtering. That one is nice and quiet, as well as holding the mixer LO frequency to the same < ppb tolerance as the generator, which is also referenced to the shop source.

Date: Mon, 10 Jan 2011 14:45:08 -0500
From: wa4aos@aol.com
Subject: [R-390] 8640B

I have (4) 8640B's in my electronics lab and use them often. I have them set up on various benches and that makes service, burn-in and evaluation all possible with minimal moving units around. I bought two of the from George Bojr in Texas and he has repaired another one for me. He has parts for the 8640B and does a GREAT job with service. The turn around was quick and I was very pleased. You can find them cheaper on ebay but understand you may get a dud and or one with split gears and other issues. George can not give you a NIST sticker but his equipment is calibrated and all of my units are dead on between units. He does sell on ebay but may have inventory for sale at any given time.

Personally, I like the 8640B for receiver work. They are accurate, dependable and small compared to older units like the 606A/B..You can also use it's internal counter for external measurements, so, it's really two pieces of equipment, though, I have other counters,

Typically, I let them warm up half an hour before I do any serious alignments as I would no matter what generator I use.. Like most HP gear, the 8640B accepts and external 10MHz reference input should you care to do that. I bought one of the 10MHz GPS receivers on ebay with antenna for around $150 and build an adequate distribution unit to reference a number of HP items in my lab. You can also find pulled Rubidium clocks with a 10MHz out very cheap now as well, under $100. Nothing like knowing you are dead on accurate.

Keep in mind, the 10 MHz external reference is just something I wanted to have; I have a very bad case of gadget-itus. Hi Hi .

The 8640B's calibrated are plenty good enough for almost anything you will need for working on HF receivers.

His email address is: www.gcbojr@aol.com

73, Glenn Scott WA4AOS DSM Labs

Date: Mon, 10 Jan 2011 12:15:14 -0800 (PST)
From: Mack Rogers <n4vgb@yahoo.com>
Subject: Re: [R-390] 8640B

And here I thought myself as being a bit obsessive compulsive when I purchased my second 8640. Bottom line is it's the biggest bang for the buck out there at this time. It's a very good and accurate sig gen with a super clean output.

Date: Mon, 10 Jan 2011 15:35:00 -0500
From: Doug Massey <dougmassey@masseyradiolabs.com>
Subject: Re: [R-390] 8640B

Amen to both posts!!!!!!!! They are the best....period.

Date: Mon, 10 Jan 2011 14:53:47 -0600
From: "Ben Loper" <brloper@gmail.com>
Subject: Re: [R-390] 8640B

This may be a tough question to answer, but how tight should the tuning knob on an 8640B be. I know it shouldn't spin like a well adjusted R-390. On mine it's consistent across the range and makes no weird noises, but there is definite resistance when I turn it and since this is the only one I've ever had I don't know if that's normal. I assume the know should be fairly stiff to avoid it moving after you set it, but I'm just curios. Mine works great. Ben KJ4CC

Date: Mon, 10 Jan 2011 13:45:05 -0800 (PST)
From: Mack Rogers <n4vgb@yahoo.com>
Subject: Re: [R-390] 8640B

Both mine are firm but not really what I'd call stiff. I presume it would also depend on how well used each one might be? I bought both mine from a surplus dealer with a good reputation and a very good bench tech.

Date: Mon, 10 Jan 2011 16:53:51 -0500
From: Jon Schlegel <ews265@rochester.rr.com>
Subject: Re: [R-390] 8640B

Of the two that I have, one tunes smooth and the other tunes somewhat stiff. The one that tunes stiff works just fine as does yours. I had to do some other repair work on this unit but I left the cavity alone. I think HP claimed that the cavity oscillator inside these units was very much off limits even to their repair depots. The cavity oscillator in these units is what really makes these things tick so if it's working for you, leave it.

Date: Mon, 10 Jan 2011 16:47:11 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] 8640B

I keep the 606 for the 50Kc IF's in some of the early tube receivers from Hallicrafters and Hammarlund. The 8640B doesn't go down that far on the RF side. The 606 does that work well.

Date: Mon, 10 Jan 2011 20:37:40 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] 8640B

>You can also use it's internal counter for external measurements

Be very, very careful. The maximum allowable input level is very low, and permanent damage occurs just a whisker above it. Best thing to do is solder the BNC cap onto the connector so you're not tempted to try to use the external counter input.

>Like most HP gear, the 8640B accepts and external 10MHz reference input should you care to >do that

Actually, the 8640B uses a 5 MHz external reference. At least, the civilian version does -- I don't remember offhand whether that is different for the AN/USM323 military version. Of course, a comparator and a couple of flip-flops (and a filter if you want a sine wave) will easily make 5 MHz from a 10 MHz reference.

Date: Tue, 11 Jan 2011 15:43:41 -0800 (PST)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] 8640B Contrarian opinion.

I lust for the dot matrix displays as used on the HP 8640. If it was new I can see one buying it.

BUT For a lot less money than a re-furbished and guaranteed 8640 one can buy a HP 8656A/B or HP 8667A series. They are electronically tuned. I?m pleased with the one I have EXCEPT it came with the basic time base which is tuned by a single turn pot. Maybe if they had used a 10 turn I wouldn?t gripe. As is it is almost impossible to set 10 MHz within 1 to 2 Hz. I?m using an external 10 MHz oscillator until I can add a better one inside. (There is space for a high stability oscillator option.) Considering the gear problem, I?d pass.

Date: Tue, 11 Jan 2011 20:41:32 -0500
From: wa4aos@aol.com
Subject: [R-390] 8640B

Yes, As Don has pointed out TWICE, the external reference for the 8640B is 5Mhz and 10 Mhz as I had mistakenly stated earlier; sorry for my error ! ! I made that conversion in my distribution box for a number of HP units I have that require 5 Mhz external reference as opposed to 10Mhz used on many other devices in my lab. My point was to give my two cents worth with regard to the quality of the 8640B as it pertains to most HF alignment issues. It's a very good sig generator and can be bought at a reasonable price. It's great for almost any application that I have needed it for during the last 10 plus years that I have been restoring receivers. Since we need to NITPICK, the 8640B does NOT go much below 450 Mhz out. I have two 8640's that go to around 435 and two that go down to about 445; Perhaps revision differences. I have the option that allow all of my generators to go above 1Ghz. If you are working on receivers with lower IF's and need to do alignments then another generator will be best. With regard to blowing up the internal counter by over-driving it. The owner can adjust the input level accordingly with an attenuator. However, for most of my applications, I have not had to attenuate an input signal. I would expect most users of such equipment would be INTELLIGENT enough to not exceed those parameters without the need to install a plug to prevent them from doing something stupid; just saying.. read your manual ! ! ! I should have made it clear that the external reference is 5 MHz for the 8640B but did not really plan on delving into the optional nicessities of my set up in that post. The external refenence is really not needed since the 8640B is very accurate on it's own. I

use an external reference(s) to make the many pieces of my equipment closely agree with each other.

As they say:
A man with a clock always knows the time
A man with two clocks is never quite sure..

Date: Tue, 11 Jan 2011 22:50:04 -0700 (GMT-07:00)
From: "Richard W. Solomon" <w1ksz@earthlink.net>
Subject: Re: [R-390] 8640B

Gee, my 8640B goes a LOT lower than 450 MHz ....

Date: Wed, 12 Jan 2011 03:40:28 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] 8640B

It's a function of the individual cavity assembly. They are specified to 500 kHz -- most will get to about 445.

Date: Wed, 12 Jan 2011 04:28:34 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] 8640B Contrarian opinion.

The 8656/57 synthesized oscillators don't equal the 8640B where close-in spectral purity and low phase noise are concerned. Note that they are not specified for spurious output within 5 kHz of the carrier -- and for good reason. Their output attenuators are prone to problems, also, and signal leakage from the enclosure is much worse than an 8640B -- enough that it often interferes with sensitivity measurements.

There is a reason that re-furbished and guaranteed 8640Bs are so pricey -- they still outperform almost everything else in several key areas. But most of us don't buy them re-furbished and guaranteed, so we don't pay nearly that much for them (I didn't pay $200 for any of mine).

Date: Wed, 12 Jan 2011 07:42:49 -0800 (PST)
From: Rasputin Novgorod <priapulus@yahoo.com>
Subject: [R-390] HP 8640B usage

Thanks to eBuy and other sources, I have some beautiful and functional HP test gear, that I used to only dream of having. Unfortunately, though I have theoretical (book) knowledge of it's usage, I've got very little practical experience.

Right now, I have an active HF antenna amplifier/splitter, (multicoupler: one antenna to several radios), that died and I'm trying to fix. The power supply is good. I'd like to connect my HP 8640B to the antenna input, then trace the signal. But I have no idea for the power level to set the HP 8640B to. Indeed, I'd be very grateful, if someone could suggest all the HP 8640B settings for this, to reduce my chance of coming to grief...

Date: Wed, 12 Jan 2011 10:59:40 -0500
From: Roger Gibboni <rgibboni@dulye.com>
Subject: Re: [R-390] HP 8640B usage

Set the output at 10 dB above the sensitivity of whatever you are using to trace the signal. Spectrum analyzer? receiver?

Date: Wed, 12 Jan 2011 11:29:57 -0500
From: Jon Schlegel <ews265@rochester.rr.com>
Subject: Re: [R-390] HP 8640B usage

A -50 dBm level into the multicoupler input is a good median level to start with. Vary the level from there as required. Even though the unit may be dead, increasing the level will usually get enough leakage signal through to get a sniff on your receiver. Also presume that the overall gain of the multicoupler around 0 dB.

A typical multicoupler arrangement is an input amplifier followed by an n-way splitter and possibly an amplifier following each splitter output. If all outputs are dead, some common element is the problem (eg. input amp, splitter). Depending on where the problem is located, you may have to break the signal path at a strategic point and "hose in" the generator at the break point to continue your search. After you identify the bad stage, you will have to, "drill down from there" as they say.

Date: Wed, 12 Jan 2011 12:20:29 -0500
From: wa4aos@aol.com
Subject: [R-390] Spectrum Analyzer

Sorry for the OT question but I am trying to make a decision regarding another Spectrum Analyzer for my shop. I presently have a very nice 8566B SA but the 8566B does not have an internal tracking generator. I know there are some nice VNA type SA's on the market such as the Array Solutions 2581 and the Ten Tec/ TAPR unit.

Being real partial to HP and Tektronix equipment, I am looking at possibly buying a 3585 A or B model. My understanding is the B model has a little better dynamic range. I have looked on the web and can't find information on the differences. Would any of the users of this list know any differences, off line or not? Perhaps the B model uses better FET's in the front end. The A model seems to be very available and the B model a little harder to find. I am wondering if one were to buy the A model, could it be upgraded to the B by changing out a few parts?? Any help will be appreciated.

Date: Wed, 12 Jan 2011 13:57:43 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Spectrum Analyzer

They are both great machines if you don't need to go above 40 MHz. The primary differences are the display and control functions and other microprocessor circuitry. For example, the A has its reticle grid on the CRT, while the B generates it with the electron gun. They have a different set of GPIB commands, as well. Functionally, they are peas in a pod. I have never noticed any difference in DR, but there may be one. Certainly, I have never needed anything better in that regard than an A. The B models were not made for nearly as long as the A's, which accounts for the present difference in availability.

>if one were to buy the A model, could it be upgraded to the B by changing out a few parts??

No. In fact, some A modules will not work in other A's of different eras. For this reason, one has to be careful when acquiring spares.

Date: Wed, 12 Jan 2011 20:09:57 -0800 (PST)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] HP And Other Signal Generators

<snip> This applies to signal generators as well. Some got their 8640B units from MARS and so sell them at a low price. Others found a deal three years ago from a epay Dum-Koff for a good working HP 8656B for $375 (me). I paid $750 for a good used Fluke 6080 seven years ago. That was a good deal.

Stuff at hamfests is usually less than epay, unless maybe you factor in the traveling expenses. All used signal generators come in varying degrees of

condition, original features, price, availability, personal preferences (buttons or knobs) and the serendipity factor of luck. (The I got the whizbang for peanuts story.) We look for the best price performance-ratio that our budgets and personal situations allow. There is no gold standard that any of us can afford. So we get what we can get at that moment in time. A reasonably working of the afore mentioned generators are far better than a URM-25 or a HP-606 IMUHO.

Date: Thu, 13 Jan 2011 21:00:46 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] HP And Other Signal Generators

I like my EICO 324! (grin)

Date: Fri, 14 Jan 2011 01:25:44 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP And Other Signal Generators

Many of us started with a 324 (that was the first generator I owned) or a Heathkit SG-8, LG-1, or RF-1U (in my view, the Eicos were much better than the Heathkits, although the 324 had its own ... character).

I was lucky to find a General Radio 805-C in need of TLC not too long afterwards. Now THAT was a boatanchor! Over 100 pounds, IIRC. It came to me along with a 1606-A RF bridge and a Millen grid-dip meter, and they all served me faithfully for a couple of decades. I still have the Millen.

Date: Fri, 14 Jan 2011 03:50:47 -0600
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] HP And Other Signal Generators

I'm still using the Measurements 82 I bought 20+ years ago at a hamfest for $25.

From: Michael OBrien <mikobrien@yahoo.com>
Subject: [R-390] Fluke 6060a/an or hp 8640b
To: r-390 <r-390@mailman.qth.net>

I have both a Fluke 6060A/AN (Calibrated) and (2) HP 8640B I might need to sell one of them Any opinions on one which I should keep? They are both used as as general RF signal generators for AM and FM work The HP's do have option # 1

Date: Fri, 14 Jan 2011 08:50:32 -0500
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] HP And Other Signal Generators

I use my HP 200CD for 455 kHz IF alignments. My first 160 M QSO ever, I made using my HP 209 as a 160 Meter VFO. The above are normally thought of as "audio" signal generators but they do great for radio work too :-). They are exceptionally fine instruments. Nobody knew how to build Wien bridge oscillators and RF signal generators like HP.

General Radio stuff was big and heavy and black... and was in a lot of labs... but was nowhere near the high bar that the HP stuff set for equipment usable in field service. And I came to prefer the same HP stuff in the lab too. (Although I do have a certain fondness for GR Hermaphoditic connectors).

I wonder if the current president of HP appreciates that they once made stuff other than printers? :-)

Date: Fri, 14 Jan 2011 08:45:29 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] HP And Other Signal Generators

Yes, indeed! My EICOs came along first with a 460 scope, then a 232 VTVM, the 324 and a 950 Bridge (which I built new from a kit; bought it at the Lafayette store in Hawaii). Still have a couple 232s (love the "center meter" scale for FM disc. etc). The 324 served for a couple decades as well - until I finally snagged my 606B. 8640s: In 1973 we (the ship I was on) got our first 8640s - I hauled a couple 390s aboard to align them. While great for doing the alignment, hauling 390s around wasn't fun. Later - I wound up in charge of the boat's "test equipment pool" - and had several 8640s - so I just "checked out" one and took it home... a lot easier to haul around than the 390s! Still - the 324 would do just fine... might not have been "dead on"; and certainly a PITA to set up for sensitivity measurements, etc. - but with care - good enough to get a 390 aligned pretty well.

Date: Fri, 14 Jan 2011 11:36:55 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] HP And Other Signal Generators

>Nobody knew how to build Wien bridge oscillators and RF signal generators like HP.

No, but good as they were, they had their own problems. The 200 CD suffers from ground loop and leakage hum that is not horrible, but is 20-30 dB above what it ought to have been. The solid state ones were way noisier than they should have been.

>General Radio stuff was big and heavy and black... and was in a lot
>of labs... but was nowhere near the high bar that the HP stuff set
>for equipment usable in field service.

My 805-C and 1606-A got hauled to innumerable transmitter sites over the years, as did many, many others. I don't think HP even had an RF bridge until after it bought Boonton in 1959 and acquired the 250-A, which was less suited to field use than the GRs.

Date: Fri, 14 Jan 2011 13:35:28 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Signal Generators, et al

I hope we have come to the end of the big "HP" stream. I do have an HP-606B, and an HP-410B. However, for signal generation to align my R-390A and SP-600, I use the tried and proven AN/URM-25, a TS-505D/U (VTVM), and a TS-585 connected to the audio output. It worked for decades, and I'm NOT about to spend a bunch of $$$ to change over. I believe that Roger, AI4NI will say that this line-up is more than adequate and up to the task.

Date: Fri, 14 Jan 2011 13:32:07 -0600 (CST)
From: nryan@mchsi.com
Subject: Re: [R-390] Signal Generators, et al

This is exactly the same setup I have and I'm very pleased with it. Sure, the AN/URM-25D is a pain to zero in at higher frequencies due to play in the gears. Has anyone tried eliminating the slack? Otherwise, my SG ain't broke, so am reluctant to "fix" it. By sheer luck, at a hamfest I found an exact replacement tuning knob fitted with a crank handle which greatly speeds up changing frequency. The TS-505D is a joy to use. I always get a kick out of nudging up the diode load reading with each alignment iteration between coil and cap on the RF deck. The analog readout is very responsive and quick to read. Another part of the fun is the retro aspect -- stepping forward into the past if you will. I operated R-390s in the USASA as a kid and later in life got into these receivers as a result of that experience.

Date: Fri, 14 Jan 2011 15:44:57 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] Fluke 6060a/an or hp 8640b

>I have both a Fluke 6060A/AN and (2) HP 8640B *** Any opinions on

>one which I should keep?

The 6060 is one of the better synthesized generators, although it still cannot match an 8640B when close-in phase noise is a primary concern. As with all computer-controlled generators, it is very convenient to change settings quickly and you can coordinate automated test schemes with other equipment using GPIB if you care to. It also goes down to 100 kHz. The HP has a considerably greater output range -- 6 dB on top and 12 dB at the bottom -- and is better shielded, so signal and hash leakage is rarely a concern. Personally, I would probably keep one of each, unless I thought I was going to need two generators that were better than the Fluke in the particular areas where the HP shines.

Date: Sat, 15 Jan 2011 02:00:09 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Signal Generators, et al

> ... Sure, the AN/URM-25D is a pain to zero in at higher frequencies
> due to play in the gears. Has anyone tried eliminating the slack?

The URM-25D has a single ball bearing at the rear of the tuning knob shaft. If the mechanism that takes up the slack in the shaft is worn or out of adjustment, pulling and pushing on the tuning knob will change the frequency. The cure it to tighten up the bearing seat. Be careful not to lose the bearing by loosening the thing instead of tightening it. Gentle tightening of the lock nut, followed by a cleaning and a spot of finger nail polish will hold the mechanism in place. (Do all this after a good long warmup.)

Date: Sun, 16 Jan 2011 13:17:37 -0500
From: Barry <n4buq@knology.net>
Subject: [R-390] HP Signal Generators

In all the discussions of HP signal generators, I don't recall the 8660C mentioned. With the correct plug-ins for modulated HF work, are these a good choice (leakage, phase noise, stability, etc.)?

Date: Thu, 10 Feb 2011 18:15:04 -0600
From: "KA9EGW" <ka9egw@britewerkz.com>
Subject: [R-390] 8640B new toy here!

Got a new generator for the bench-an 8640B with option 004, the 1dB step attenuator. I'd like to add option 001 [the continuously variable audio oscillator] to it, and I understand option 001 is retrofittable, but as yet I have no clue where to go for parts or documentation. Even without option 001, it's still a very nice tool.

Date: Thu, 10 Feb 2011 20:46:28 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] 8640B new toy here!

I got my first HP-8640B last week. It has Option 3. I've done a small amount of fixing to it, but nothing very major. I'm lovin' it.

Date: Thu, 10 Feb 2011 23:03:36 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] 8640B new toy here!

Is Option 3 the frequency doubler extending the range to about 1 kmc? (kHz) The 8640 I have here does not work on FM. If anyone has a spare FM board, I might be able to buy it and fix my generator,

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Date: Fri, 11 Feb 2011 09:18:06 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] 8640B new toy here!

Option 3 is Reverse Power Protection. Mine came with one of the cards necessary for the frequency doubler, but there is additional circuitry required to make that option fully functional.

The gears in mine are cracked but not separated as much as some I've seen. Still thinking about how I want to make that fix before they get worse.

Good luck with the FM board. There are a lot of individual boards on eBay but they're pretty high in price and no guarantees.

Date: Fri, 11 Feb 2011 14:30:27 -0500 (EST)
From: frankshughes@aim.com
Subject: Re: [R-390] R-390 Digest, Vol 82, Issue 14

http://groups.yahoo.com/group/hp_agilent_equipment Is a good place to get help and advice from other HP owners. I ordered some of the 8640B gears that the guy in Italy casts, just to see what turns up. (Mine aren't cracked now, but having spares insures that they never will fail, especially if they are stored where the 8640B can see them...)

Date: Wed, 16 Feb 2011 19:20:11 -0500
From: "Michael, W1RC" <subs@w1rc.net>
Subject: [R-390] FS: USM-3A including TV-4A/U Tube Tester and TS-673/U Signal Tracer

Found this treasure in the basement.....

This is an incomplete US Navy USM-3A Test set. The USM-3A is a complete miniaturized service kit for tube-type equipment and was designed for use in the field to troubleshoot and make temporary repairs to equipment. The whole thing fits into a 1 cubic foot metal case, the CY703A/U. The TV-4A/U is a compact tube tester made by Weston and does a remarkable job of testing tubes for its size. Also included is the TS-673/U signal tracer and is complete with the neat metal box containing the probes and the little headset. The Technician's Handbook that fits inside the case is also included. I also have two of the neat probe meters that came with the kit. However they are missing the metal spring ring that keeps them closed. I don't know if they work. Here's what's missing: The decade resistor, decade capacitor, all the tools, the probes, soldering iron. The TV-4 alone sells for around $200.00 when they surface. The metal case with the signal tracer probes and headphone is very hard to find but it appears complete. I am asking $250.00 for it plus shipping. I know that I could get this and possibly more easily on ePay but I'd like to see this rare gem go to one of the R-390 gang. If interested please reply by e-mail.

Date: Sat, 19 Feb 2011 20:30:50 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] HP-410B Question

> I have an HP-410B that I'm restoring. It has a small value cap (5000pf or so)
>across the meter but it also has a 50uF cap across the meter as well. I've been
>advised to just remove that 50uF cap as it isn't really needed (it's not on some
>of the newer models).

When I asked why two caps - he noted that the smaller cap was to bypass any RF that might leak into the meter movement from the front - since the shielding wasn't all that good there... and the larger one was to slow down the response so the pointer and the rest of the works didn't "slam" off the stops so hard on an overload... He too noted that the larger caps had been left out of later production units.

Date: Sat, 19 Feb 2011 23:40:38 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] HP-410B Question

That's what I figured. While the meter will function without that 50uF, I think I will replace it. I really like the damped meter movement on these VTVMs.

Date: Tue, 22 Feb 2011 12:14:45 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>

Subject: Re: [R-390] R-390A tube adapter

The tube adapter is really an extender so you can access the pin connections on a tube base to measure voltages or resistances. Many folks who have serviced these radios professionally (military) have indicated that they never used them. They are homebrew devices with a pin base and a socket, attached with fairly inflexible wire so you can raise the height of the tube up to a point where you can get to the individual pins (little loops or taps to connect at the top tube socket. There are a few drawings that give examples of what these look like.

Date: Tue, 22 Feb 2011 10:32:32 -0800
From: Dennis Wade <sacramento.cyclist@gmail.com>
Subject: Re: [R-390] R-390A tube adapter

I have found commercial versions of these devices (i.e. 7 and 9 pin test sockets) useful when looking at tube pin voltages and signals.

Date: Tue, 22 Feb 2011 13:54:12 -0500
From: 2002tii <bmw2002tii@nerdshack.com>
Subject: Re: [R-390] R-390A tube adapter

Back in the day, tube extenders were made commercially. Some examples can be seen at:

http://k4che.com/tube%20extenders/TUBE%20EXTENDER%20PAGE%201.htm

For equipment like the 390/390A, where the bottoms of many tube sockets are inaccessible without disassembly (and even if you disassemble, it is often difficult to operate the disassembled radio unless you have extender cables), tube extenders can be very useful in troubleshooting faults. IME, tall ones are often better so that the test point contacts are more likely to clear IF cans and other things mounted near the tube sockets in densely-packed chassis.

Date: Tue, 22 Feb 2011 20:25:22 -0800 (PST)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] R-390A tube adapter

Agree. Those tube adapters allow one to check operating voltages very easily and safely in an operating crowded R390A. Over the years, I have stumbled

upon some, and found using 3-4 of them in the audio or IF decks invaluble and a real timesaver when trouble-shooting.

Date: Wed, 23 Feb 2011 19:29:13 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] HP 8640B gears arrived from Italy!

I had heard someone was making brass replacements but have never been able to find the source...

Date: Wed, 23 Feb 2011 19:56:14 -0500 (EST)
From: frankshughes@aim.com
Subject: [R-390] HP 8640B gears arrived from Italy!

Here are photos and an action movie (movie from Emanuele, the gear manufacturer) of the HP 8640 gears I received from Italy. I bought them on the e-pond for spares, should the 8640 ever need them. The trusty URM-25D could also be warmed up to provide signal for the 390 or 390A, in case of an 8640 failure, I suppose, but.....

http://i180.photobucket.com/albums/x257/fish1_07/gears1.jpg
http://i180.photobucket.com/albums/x257/fish1_07/gears2.jpg
http://i180.photobucket.com/albums/x257/fish1_07/gears3.jpg
http://www.youtube.com/watch?v=MszkI32MFPE

Date: Wed, 23 Feb 2011 21:17:43 -0500
From: "Jerry O. Stern" <jsternmd@att.net>
Subject: Re: [R-390] R-390A tube adapter

Lots of tube adapters on Ebay with 7, octal and 9 pin and with tube pin test points as well.. best quality bakelite made by vector and pomona. Be careful to get the skinny versions as the standard 7 and 9 pin are too fat to fit inside a tube base with integral shield sleeve.

Date: Fri, 4 Mar 2011 22:33:09 -0500
From: Steve Byan <stevebyan@verizon.net>
Subject: Re: [R-390] OT: HP-410B Tubes

Thanks for the report on your HP-410B experiences. It's motivated me to get mine off the shelf and on to the bench.

One question - how the heck did you get in there to recap it? I've removed the chassis screws and desoldered the AC line input connection to the front panel switch, but the cable harness is still to tight to let me into the innards. Did you have to unsolder much of the wiring? Mine's an old one too, pre-PC board. I did

manage to get in to clip out the 0.01 uF Black Beauty caps across the AC line - it's scary to think what those things must be leaking to the chassis ground!

Date: Fri, 4 Mar 2011 22:47:59 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] OT: HP-410B Tubes

It wasn't too hard to do. If you remove the switches, pots, and panel lamp from the front panel, it all comes apart pretty readily. In order to replace the bypass caps on V2, I had to remove the screws that hold the resistor board and move it out of the way as much as possible. After that. it's not too bad.

Mine had the monolithic-style 1uF Sangamo filter cap. I used the existing mounting screw holes to mount two old-style solder posts and the new filter cap fit right between them. I had to splice one wire to get it to stretch to one of the posts (I didn't want to clip all the lacing just to get some slack in that wire). One of those Black Beauties was leaking both physically and electrically (it made a pretty nice 82k-ohm resistor...). I didn't replace them as the newer models didn't include them anyway. It was suggested to me to remove the 50uF cap across the meter (it isn't on later models); however, I opted to replace it (with a 47uF) as I like the extra damping it gives to the movement.

Date: Fri, 4 Mar 2011 23:21:43 -0500
From: Steve Byan <stevebyan@verizon.net>
Subject: Re: [R-390] OT: HP-410B Tubes

Thanks, now that you point it out it's obvious :-)

Date: Thu, 30 Sep 1999 16:55:26 -0500
From: "Larry Shorthill" <r41656@email.sps.mot.com>
Subject: Re: [R-390] Tube testers

On the other hand, if a tube tester says a tube is bad, it may be bad and if it says it is good, it may be bad. The operation of the tube in the actual circuit is the best indicator of whether the tube is good or bad. Gassy tubes and shorted tubes may be an exception to this, but an example of an indicated "bad" tube working in a circuit is with the PTO 6BA6, which probably acutally works better with a tired tube than with a new tube. Less drift, etc. That circuit doesn't age tubes very quickly and doesn't demand much from them either.

Tektronix made curve tracers and other things for testing tubes way back when, but those who were in the know there always used good old tube substitution into the actual circuit to determine whether a tube needed changing. And again, a tube that won't work in one circuit may actually work fine in another (see note above on 6BA6).

Date: Wed, 03 Nov 1999 20:16:32 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] I.F. module

Is there any relationship between a tube with grid emmision and one going microphonic? Or are these situations generally independent of each other?

Date: Fri, 01 Oct 1999 09:45 -0700 (PDT)
From: rlruszkowski@west.raytheon.com
Subject: Re[2]: [R-390] Tube testers

I do not know about turkey tube testers. The trick is to get the tester set up for the tubes elements to pins and then get some idea of the current flowing through the tube under load.

Problem 1 the socket is shot. Find the 7 and 9 pin socket savers used on the TV7. these look like a tube extender about 1/4 high. you plug these in and leave them plugged in. Then you wear out you socket saver testing tubes.

Problem 2 finding set up values for the tube. If the tube is listed in the manual you are in. If you can find a tube listed in the setup guide that uses the same base as you tube by looking them up in a tube manual base diagram table you are almost in. You need to make some educated guesses for the bias setting.

If you really understand your test circuit you can do setups for tubes on the fly if you know its pin arrangement. Testers come in two flavors. For this pin on the socket set the voltage to cathode, grid, plate, screen, filament. Or for this voltage apply it to pin 1,2,3,4,5,6,7 etc..

Then you need to set the variable voltages. Plate and grid bias. Test then does a current measurement through the tube. The bias voltage is "engineered" to give a good to bad reading. The gas test is relevant. Gassy tubes = noise. Gassy tubes may be microphonic. These tubes are also going to fail and maybe cause smoke. Shorted tubes are bad and also likely to cause smoke. Smoke is bad, ask the surgeon general.

Tube testers will not test microphonics. Tube testers will not test noise.

Tubes should be tested to get the shorts, gas, and low emissions weeded out. In many tube applications that all you need to do. The noise of the tube is not reverent to the circuit performance. Or the noise is below a relevant factor in the circuit.

Then us receiver guys come along with extreme demands for tubes. Tube testers just will not tell you the same thing about a tubes noise as plugging a 5749 into the first IF of a R390, amplifying the noise through an IF and Audio

subsection and measuring the output to fractions of a DB. While you are doing these type of noise test also thwack them to see if they are microphonic. 6C4 will become microphonic in the mixer stages.

Date: Fri, 01 Oct 1999 12:25:01 -0500
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Tube testers

One test you missed, grid emission. Back in the tubes in TV set days some repair shops swore by grid emission testers, made more good diagnoses with the grid emission tester than the standard tube tester without grid emission. Its certain that in a receiver, grid emission wrecks AVC action. And its worse in receivers where the IF tubes are run at high currents to get the gain after the selectivity, such as in the 75S Collins lines. Though there its easy to detect. When the S-meter deflects backwards, its time to look for an IF tube with grid emission. There used to be a small tube checker made just for testing for grid emission. I have one, but haven't used it much.

I believe in a tube checker as a MECHANICAL check, not a performance check. I figure if the cathode has enough emission and all the elements are connected their pins and not shorted together, its going to have the gain. I can't conceive of a common failure of a tube that can cause a loss of gain that wouldn't lead to a short. I suppose the grid wire could break, but if it isn't continuos (and its supported by a sturdy wire cage), its likely going to flop to the cathode or screen. So I use the old emission tester as my fundamental test, and watch for grid current with the grid emission tester.

With the emission tester I check for open elements and for shorts. Most often a tube fails from wearing out the cathode emission, or shorting heater to cathode, or getting gassy. All these may affect gm reading on a transconductance tester, but only incidentally by changing the available plate current. Sure the gain will check low if the plate current is way down, but the gain wasn't low, the plate current was way down so the indication is false. With lo plate current, the tube couldn't develop the voltage swing on the output load that was expected. But if the tube is low on emission, and the transconductance tester doesn't use as much plate current as the operating plate current it can miss the problem.

Sometimes really bad tube noise, such as intermittent open elements (bad welds) can show up in the tester by tapping on the tube while testing for shorts, opens, and emission.

One other good test with the emission test, is to drop the heater voltage and see how much reserve there is to the emission. I've not refined that test since I figure if it has emission at rated voltage and I'm running it normally, it will

continue to work as long as it works. Then it will fail, and it will eventually fail, they all do.

Socket savers have always been a good idea.

Date: Wed, 03 Nov 1999 21:38:47 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] I.F. module

> Is there any relationship between a tube with grid emission and one going microphonic?

I've never made such a connection. Generally I'd figure a microphonic tube had cracked grid wire to grid support rod welds from thermal cycling or impact. Though, since grid emission, especially in an AGC controlled stage would drive the grid positive from the emission current through the megohms of resistor in the typical AGC circuit, and that would cause the plate current to be high, which means the tube gain is high and so a little grid wire motion would be heard at the output more. So there might be a correlation.

Grid emission comes from cathode material having been sputtered from the cathode onto the grid wires. which might also make the grid wire heavier and so more subject to motion from external sonic excitation... e.g. it acts microphonic when tapped.

Without confirmation of the grid emission by a positive grid voltage, or excess plate current and near zero grid voltage, or by using a grid emission tube checker, I don't think I can say that I'd use microphonics as a symptom of grid emission. I'd want to replace the microphonic tube to prevent microphonics from getting into feedback from the speaker and transformer vibration anyway. And I'd want to replace the tube with grid emission because it upsets the AGC which leads to distortion, and burned fingers when preparing to pull the hot tube for testing because of the high plate current. And every time it happens to a 6BA6 in the IF of my 75S3B it makes the S-meter pin backwards.

Date: Mon, 24 Jan 2000 14:34:55 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] Re: Tube Testers

I don't have any real experience with commercial tube testers. Other than for CRT testers, all of the testers I've owned were military ones. I guess that if I could only have one tube tester, I'd have to go for the TV-7D. It seems to have been about the most common military tester made and one of the easier ones

to track down parts for if you need them. The calibration procedure isn't difficult (if it's a D model) and they're pretty reliable. Replacing some parts in them is a pain in the ass, they're pretty compact. I've been using one of mine for 25 years. I've worn a lot of paint off of the front panel and it's ugly as hell, but it works like a champ. Also, the TV-7 series has probably got the single most comprehensive list of tube types that it can test of any of the military testers. The Govt supported them as far as settings data well up into the 1980's. In addition, there are compactron adapters, nuvistor adapters, etc. for them. They're pretty versatile.

If I could have a second, it'd be the TV-2 series. Rather large and heavy, they're fairly easy to find parts for and are very easy to work on. There's so much room in them that they came with spare tubes, fuses, etc. all integral with the tester. There are no previsions for calibration. If the five meters are right and none of the resistors have drifted out of spec, it's on the money. period. There's a pretty decent number of tubes that it can test, but there isn't as much published data for them as the TV-7 series. Due to the large number of controls they're not nearly as fast to set up as the TV-7D. If you're clever and have access to the published tube specs on a particular tube that's not listed on the roll chart or in the supplement book, you can easily determine the setting and test it. The plate, screen, bias, filament, etc. voltages can each be manually set using the separate meters and controls for each of these functions. Then you convert the reading into micromhos and compare it with the published tube data. If you want to monitor the current of any of the specific voltages, it's a simple matter to build a simple adapter with an old tube base or plug and an extra tube socket to allow you to insert a current meter into the circuit. I'd call the TV-2 series the hardware hackers tube tester of the military ones. It's a manly looking tester and simply owning one will boost your testosterone levels and put hair on your chest.

Number three on my list would be an I-177B with an MX-949A/U adapter box. Actually, this is my favorite tester, but in all honesty it isn't as versatile as more modern testers. If you're into pre-1950's radio receivers, etc., it should handle it just about anything you'd need. In addition, it's real fast to set up.

>I've got a hamfest coming up in Raleigh in the early spring and want to know what to look for.

The killer any more is the cost. I've never paid more than thirty five dollars for a TV-7D. I've had at least a dozen pass thru my hands over the years and kept two. My ugly one and a pretty one for a spare. Lately, I've seen them hit better than three hundred dollars. Several that I've owned were free. I bought a like new TV-2B from Fair Radio as a "checked" model back around 1989 for a hundred dollars with all of the original spares, etc. I don't even want to tell you what people have been paying for them today. I guess that what it boils down to is what you can either afford or are lucky enough to stumble into. Personally,

there's no way in hell that I'd pay today's prices for a TV-2 or TV-7 series, Much less the seven hundred dollars that I've seen a Hickok 539C sell for. Keep your eyes open for a good clean working TV-7D. If you find one priced reasonable, scoop it. Lately, a lot of the ones I've seen are really beat to hell with serious dents in the case. If it got hit hard enough or dropped from enough height to distort the case like that, there's the change that the meter movement's life has been either shortened or terminated. There's also a good chance that a switch sections or two can be damaged. You haven't lived until you changed a "letter" switch in one. ;-(If you don't luck into a TV-7D, and happen to find something like an Eico 667 or something and it's cheap and in good shape, scoop it. No tube tester is really what you'd call 100%. I'm sure that almost everyone here in the list that's used tube testers for any length of time will agree with me that they'd had that tested weak/bad and worked just fine in the radio, etc. The same goes for tubes that tested good but were deader than a hammer in the radios, etc.

I guess that you could equate a tube tester to the fuel gauge in your truck, or your automobile if you're a not true redneck. :-) If you're pulling out onto the road and you look at the gauge and it indicates full, it doesn't necessarily mean that you're going to arrive at your destination. The gauge could simply be wrong, the engine could sling a rod, overheat, you could puke a fuel pump, you could wring the teeth off of a planetary set in the transmission, or any one of dozens of other things could fail and put you into tennis shoe backup mode.

The same goes for if the gauge reads empty. It could be wrong and you actually have a half a tank. But maybe not. ;-)

Date: Mon, 24 Jan 2000 14:20:51 -0800
From: "Glen Galati" <eldim@worldnet.att.net>
Subject: [R-390] Re: TV7 Series (Tube Testers

TV-7 Series (Hands Down) Simple to use, compact, can improvise to check unlisted tubes, Jacks for Noise Test. B&k 747 for newer tubes. i.e. Novars, Compactrons (Won't do Old large base 4,5,6, & 7 Pin Tubes). I've used my TV-7B regularly since 1969 without any major problems. Changed out 9 Pin socket and replaced #83 once in all those years. For detailed analysis, the TV-2 is very handy, but cumbersome and takes much more time to set up. The TV-3 and TV-10 are okay, although I haven't had the experience to evaluate their performance.

Date: Mon, 24 Jan 2000 20:47:34 -0600
From: Randy Guttery <comcents@mississippi.net>
Subject: Re: [R-390] OA2's

One other thing I might mention - kicking the filament up a notch (or two if you're REAL brave) for an hour or so is a way to "boil off" the cathode(s) of indirectly

heated tubes (most modern ones). This can contribute some to the "rehabilitation" of a weak performer...

Date: Tue, 25 Jan 2000 10:09:33 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] tube testers & meters...

EVERY meter should be supplied with back to back diodes in parallel so long as its has no internal multiplier. The diodes can be substantial, at least and amp or two rating and need to be silicon. The typical 1 ma meter movement has about 50 millivolts drop and at that voltage the forward current of the silicon diode is pico amps, essentially an open circuit. While germanium diodes conduct at a lower forward voltage their leakage is significant at all voltages so they can upset the meter calibration. Silicon power Schottky may give more protection than ordinary silicon.

For some reason at Collins in 1964 that was NOT standard practice and with the high voltage multipliers located outside in the power supply cage we lost a few meters until I added that meter protection. Once I added the diodes (and proved to the old timers that the diodes didn't change the calibration) foggy days didn't wipe out plate voltage meters, they just read very high.

Any fuses need to be rated for interruption voltage. I fear the pico fuses may not be rated for high voltage interruption. Read their specification. Ordinary fast blow fuses may be cheaper, or may not be. The very low current fuses classically used a platinum hair for the fuse element and were several bucks each. The same fuses were used for microwave bolometers, where the RF power applied changed the resistance and the test equipment measured that change, often by putting reducing the DC bias voltage to keep the same resistance, so the RF power was equal to the DC removed to keep the same resistance. That extra use for the very low current fuses didn't lower the price from several bucks a fuse. Probably the blown fuses shouldn't be tossed but taken to a jeweler's for reclaiming the platinum. Platinum was used in the 1 and 2, maybe 3 ma fuses. I don't know if it still is but if they are more than a few bucks a fuse it probably still is.

Date: Tue, 25 Jan 2000 19:12:29 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] I-177 series setting data...

Still not bad. If you get a chance, ease on over to my I-177B page at either:

http://www.acadiacom.net/nlee/i177_index.html or
http://home.gs.verio.net/~nlee/i177_index.html

and download the I-177 tester setting data that I did last year. I combined the settings from about a dozen different military manual and supplements and the commercial Hickok manual for the I-177 type into an Excel workbook format. The latest data was from 1957 if I remember right. The version I did contains thousands of lines of setting for use with both the plain I-177 series and for the MX-949* adapter box. There's also instructions for building the adapters to test 5814's and 12AU7's in the standalone I-177. In the event that you don't have or don't use Excel, you can hit the Microsoft home site and download a free viewer for Excel.

Date: Tue, 25 Jan 2000 19:36:57 -0800
From: "B.L.Williams" <B.L.WILLIAMS@prodigy.net>
Subject: Re: [R-390] tube testers & meters...

> It's still pretty rough. The I-177 meters are out there. I picked
> up a NOS spare Simpson one last year for ten dollars as part of a
> deal on some other stuff. A few weeks later, I watched Surplus Al
> sell one on ebay for about fifteen or twenty dollars. Still not a bad deal.

Yep, that is a good deal. I forgot how I came about my replacement meter. Somebody had one they were willing to part with. I found this guy through some hurried bumbling around on the net. Then, someone else asked for my old one and had a really good reason to want it so I sent it off to him. Wish I had kept it but he needed it and I'm not selfish.

> The early meters, like the I-177 Simpson, are held together with three screws
.....

My replacement is the Simpson 3 screw type. Glad to find that this morning when I read your mail and went to check. I think the old one was the sealed meter. I remember looking at it and thinking that a hammer was called for if I was going to open the thing up. It sure did flash nicely though when I burnt it up.

> Which model tester and meter?

Supreme I-177B with a serial number of 833, Order No. 2960-P-52-04. I finally found the MX-949A/U last year after 3 years of searching. It is stamped as Order No. 3029 Ph. 61. I paid too much for the adapter but after looking all over the place I was ready to just buy the *##@ thing and be done with looking. I think that they will remain next to impossible to find.

> Or a pair of long thin hemostats with a couple of flats ground
> into the serrations to put the lockwashers and nuts in place.
> Been there, done that. Several times. <grin> > nolan

I will make those the next time I have to open it up. I found some paperwork and a spare knob inside when I did. Thanks for the info. By the way, your I-177B database is purely awesome. I use only that now and it is truely a thing of art. Wish I remember the guy who wanted to charge $5 per tube to figure out the settings for the I-177 but changing computers a few times and moving 3 times contributed to losing addresses and notes on things.

Date: Sun, 13 Feb 2000 17:18:54 -0500
From: km1h@juno.com
Subject: [R-390] Wtd: TV-7 info

A TV-7A/U followed me home.....now I need to know how to care and feed it. Used these things for more years than I will admit to in the Navy but haven't used one in many years. Belonged to another Ex-Navy ET friend who runs a 2 way radio shop and has finally decided he is no longer doing tube radios! Contract # 25006-PH-54 Serial # 5447SLE Im guessing that is a Philly Navy Yard or Philco 1954 contract?? Has the manual , adaptors, pin straighteners in the cover and some addemum sheeets. Worked when I turned it on but what should I really do to this before getting some serious use? Sorta remember some TV-7 threads here but out of sight out of mind. Latest chart info?

Date: Sun, 13 Feb 2000 16:46:51 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] military tube tester data beta available...

The Excel version of the settings data for the TV-2 series military tube testers is slowly getting there and now covers everything from the 00A to the 809 that I have data for. There's over 1800 lines of settings data so far and I have a hell of a long ways to go. I'm dreading the xxxx four digit tube numbers. :-) For the source material, I'm using the roll chart out of my TV-2B and the June 1966 edition of the little 72 page TV-2 series supplement book TB 11-6625-316-12/1 If you have later source material, contact me. I'd like to include any settings in it that are lacking from the material that I have.

At any rate, a BETA of the file is available from
http://www.acadiacom.net/nlee/beta/beta011.zip

It's a zipped archive containing an Excel workbook format file and contains nothing except the settings. This is a BETA. Error checking of the data is non existent, or nearly so. There ARE errors in the original roll chart and the

supplement book. I've caught some of them. I've probably also added a few thru typos on my part. VERIFY the data before you use it. <snip>

I don't mind putting this type of information together and making it freely available. This is my third such project involving military tube tester data. BUT, I could really use some outside help in checking the data for errors, typos, missing data, etc. I'm debating on possibly taking the data, once it's all typed in and well checked for errors, and putting in into a database format with a nice little search interface. The killer is the initial typing of the data. After that, cut and paste will be REAL nice. Also, the next project will be an electronic version of the TV-7 series tube tester data. I had originally planned to do it before the TV-2 series roll chart, but my response for supplements and changes to the 1962 manual really sucked so I'm still in the information gathering stages for the TV-7 testers. If you go to

http://www.acadiacom.net/nlee/tv-7_index.html

you can see the TV-7 source material that I've got. I need a mess of missing supplements to the 1962 11-6625-274-12/1 manual. I don't want your originals. Sharp clear photocopies are fine. Even though the I-177 series project is "finished", I'm still looking for manuals or supplements other than the dozen or so that I used to create the Excel file for it. A list of the manuals that I used is available at: http://www.acadiacom.net/nlee/i177_index.html along with the actual I-177 settings data file. I think that there's a total of 3000 or so lines of settings data in it for using the I-177 series both with and without the MX-949x adapter box.

Date: Sun, 13 Feb 2000 18:44:49 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] Wtd: TV-7 info

The best thing you can do for your TV-7*, bar none, is to send it to Dan Nelson in Phoenix. He's a whiz at getting these sets up to snuff and he won't charge you an arm and a leg. djn@goodnet.com
He also has a huge inventory of "used" (mostly cherry) tubes that he lets go for very little. Before shipping, tests them himself on his-- well guess! Believe me, you won't be disappointed.

Date: Sun, 13 Feb 2000 19:33:02 -0500
From: "Gary E. Kaufman" <gkaufman@bu.edu>
Subject: RE: [R-390] Wtd: TV-7 info

I have the TV7 settings book scanned into a PDF file. Unfortunately the file is too large for easy transfer (>40mb if I remember correctly) but it is nicely indexed and prints well. I sent a copy along for the "unofficial R390A cdrom set" so perhaps it will be included in a future release. It the meantime feel free to contact me off list and I can certainly arrange to get (or print) a copy for you.

Date: Fri, 03 Mar 2000 08:32:15 -0500
From: "Richard A. (Tony) Stalls" <bc348@sprintmail.com>
Subject: Re: [R-390] FS: TV-7D Tube Tester

Two points...

1. Fifty bucks for a working TV-7 these days is a great deal. Like Brian (VE3UU) said, "I'd buy 10 or 20 at that price" too!

2. The TV-7D/U was (I believe) the last model of the series and according to the TM 11-6625-274-12 operator's manual, the differences are:

	TV-7A/U	TV-7D/U
1. F Range on function switch	No	Yes
2. Bias and Shunt Controls	Engraved on dial	On test set panel
3. Shorts lamp	No panel marking	Panel marking
4. AC cord & lead storage	None	Yes
5. Gasket around cover	None	Yes
6. Socket Saver adapters	None	Provided

According to the TM 11-6625-274-35 field and depot maintenance manual, the TV-7D/U also has antiparasitic beads placed on leads soldered to all tube sockets, except sub-miniature sockets X109 and X110, pins 1 and 4 of X103 (4-pin) and X105 (6-pin), and pin 8 of X111 (octal). There are several circuit changes noted in a table, but I won't go into them as they relate to the schematic.

Michael and I each bought NOS TV-7D/U's in their sealed Signal Corps boxes a couple or three years ago at the Gaithersburg hamfest. If this is what he's offering for sale, it's probably in like-new condition, like mine still is. (No, mine is NOT for sale! <g>) However, I'm sure you can get a well used one for less, but if you what want the best, I'm confident that it's worth at least what he's asking. I'm sure he'll that and more if he puts it on eBay.

Date: Wed, 10 May 2000 11:35:54 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] mil tube tester info update

I've typed in well over a thousand lines of settings data so far for the TV-7 series tube tester from the January 1962 edition of the TB 11-6625-274-12/1 settings

book. I'm using the edition with Changes up thru number 3 incorporated. After I finish typing in all of the data from this book, I'll start adding all of the Air Force 32* changes. I've got almost all of them but am still missing a few. A list of them is on my site. If you have access to any of the several that I'm missing, drop me a note. Another six weeks or so and..... <grin> Actually, if a few of you would care to spend some time, proof reading it, I'd be happy to send you a section. Say, all of the 0xx, or 1xx, or 2xx numbered tubes. For the 6xx tubes, I'll break it down as 6Axx, 6Bxx. etc. Let me know which section you'd like to proof and I'll attach it to you. They are in EXCEL workbook format. Details for downloading a free viewer from Microsoft are on my site. I recently acquired another military tube tester model. It's a TV-4A/U built by Weston in about 1953. I intend to do a file on it also as far as instructions and the data settings go as soon as the current TV-7 project is done. So, I'm now in the information gathering stages for the TV-4 series tester. I think that it was originally part of the I-56 series test set. So, if you have a TV-4 series and or data for one, I'd really appreciate hearing from you.

Oh, my site is at: http://www.acadiacom.net/nlee/
and a mirror site is at: http://home.gs.verio.net/~nlee/

There have been recent updates to the I-177 and TV-2 series settings data files. thanks, nolan

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Date: Sat, 25 Nov 2000 21:42:47 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: [R-390] TV-7 Shorts Problem

Very quiet on the R-390 front. So here's something to work on.

Last night, my TV-7D/U started giving false indications on the shorts light. It seems to show a short for every tube on position 5 of the shorts test. I've tested with known good tubes of the same numbers, but two of the numbers (at least) giving the "false positive" are the 5814's and the 6BK6's.

I haven't opened it up yet, so maybe this is premature, but anybody have any clues? (No the light doesn't come on if there's no tube under test.)

Date: Sat, 25 Nov 2000 22:08:00 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] TV-7 Shorts Problem

Are you sure there's not grid emission on those tubes showing up as gas?

Date: Sat, 25 Nov 2000 23:19:18 -0500
From: "Barry Hauser" <barry@hausernet.com>

Subject: Re: [R-390] TV-7 Shorts Problem

I doubt it -- too many NOS tubes showing the short on position 5 of the shorts test. Also, I had tested all of them when they came in within the last year or two and none showed shorts then. Seems as though this just started up. For example, both 6AK6's showed short on 5 that were in the audio deck. I routinely test new tubes when I install them and the two new ones I had on hand showed the shorts. Ditto for a 5814A. I did have the tester idling for a long time last night. Maybe something overheated.

Date: Sat, 25 Nov 2000 22:23:56 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] TV-7 Shorts Problem

NOS tubes can have gone gassy in a year. Check for a positive grid voltage when the cathode has been hot a while.

Date: Sat, 25 Nov 2000 21:58:54 -0700
From: "Kurt" <radiouser@uswest.net>
Subject: Re: [R-390] TV-7 Shorts Problem

Check your line voltage setting. I have seen where too high of a line voltage setting will cause shorts to show up where there are no shorts.

Date: Sun, 26 Nov 2000 18:45:17 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] TV-7 Shorts Problem

I recall a similar problem with my TV-7D/U. You do a lot of turning of the FUNCTION SWITCH knob, right? I do as well when doing the full monty tube test. Open up the tester and blow out any dust or contact wear from said switch (got compressed air?), then spray some DeoxIT in there. Apparently contact wear produces enough metallic bits to cause "false positives." Let us know how you make out.

Date: Sun, 26 Nov 2000 19:04:28 EST
From: Llgpt@aol.com
Subject: Re: [R-390] TV-7 Shorts Problem

Good advice Norm, a shot of De-Oxit works wonders many times.

Date: Sun, 26 Nov 2000 20:19:52 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] TV-7 Shorts Problem

Thanks! BTW, DeoxIT shouldn't harm the TV-7D/U switch as its wafers are ceramic. R-390* switches don't like DeoxIT on their phenolic wafers. (Dab the contacts only and sparingly.)

Date: Sun, 26 Nov 2000 20:33:54 EST
From: Llgpt@aol.com
Subject: Re: [R-390] TV-7 Shorts Problem

Especially SP-600 switches < grin >

Date: Sun, 26 Nov 2000 20:57:26 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] TV-7 Shorts Problem

Thanks for the tip -- the switch seems like a possibility -- Hey, you wouldn't be suggesting that there are some conductive, uh, chads in there!!! Oh no! It's bad enough that we have to do so much switch flipping with these testers, now there are gonna be a half dozen recounts per toob.

Seriously though, I don't know how you'd avoid beating up that function switch. The procedure is to run it through all 5 shorts positions before going on to the quality test. As I understand it, you're not supposed to do a quality test on a tube that shows a short, lest you damage the tester. Are you saying that you skip the shorts test?

I'll check out that switch. I have compressed air cans and plenty of deoxit. I also suspect the 7 and 9 pin sockets which are very close together. The socket saver in the 7-pin is a little loose.

Date: Sun, 26 Nov 2000 20:47:29 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] TV-7 Shorts Problem

Ceramic wafers are sponge too. They are not glazed.

Date: Tue, 28 Nov 2000 01:39:23 -0500
From: "Barry Hauser" <barry@hausernet.com>

Subject: Re: [R-390] TV-7 Shorts Problem

I opened up the tester and scouted around. I did notice some micro metal flakes clinging to the back of the panel, but none near the switches.

I managed to fix the problem -- false short reading in position 5 on the shorts test switch. But, I suspect that wasn't the switch at all -- more like shorting under the 7 and 9 pin tube sockets. However, I do have a "switch issue". On the rotor contacts of most of the switches and smeared on parts of the ceramic wafers was this black stuff that looked like graphite lubricant. The design of the wafers is such that it was unlikely to cause shorting -- there are deep grooves in those wafers that accommodate the stationary contacts.

It seems as though the undersides of the rotors were coated with the stuff. It cleaned off fairly easily but consumed a lot of swabbies. Funny thing though -- the stuff turned the swabs black but it wouldn't come off on my fingers the way most goopus will. At first I thought was silver oxide or some kind of oxide - but no. Anyway, I DeOxited the switches as best I could with the swabs, mostly relying on coating the rotor metal and working the switches. Although it might be safe enough to spray DeOxit on ceramic switches, they're just too dense in there and it would make for a drippy mess. Before I did that I blew out the works with compressed air.

Now, for what looked like the real problem, which I suspected from the start: The TV-7D/U has ferrite beads on every tube socket terminal. Normally -- at least from what I know -- ferrite beads are placed on insulated hookup wire -- over the insulation. These are backed up right onto the socket terminals, actually touching them. A couple of these looked like they were touching -- between the 7- and 9- pin sockets which are right next to each other. Also, there isn't much clearance on the 7-pin by itself. I re-dressed the terminals and wires to make sure they would be clear. What made me suspect this -- the 7-pin socket was a bit loose. Problem is that the mounting flange is too weak to stand up to the constant plugging and unplugging of tubes. Even though the socket saver was tightly bolted to the original socket, the whole business wobbled in the mount. The best fix is to find another fiber washer to put under the socket saver on the outer panel side, so when the thing is tightened down, it pulls up tight against the panel. (I didn't think of it when I had it partially disassembled, but maybe a shot of DeOxit on the fiber washers that are there would have swelled them up.) I "improvised" with a twist tie around the socket saver on the top panel side. Another fix might be some epoxy around the base of the original socket where it meets the flange. BTW, this TV-7D/U has a meter that says "TV-7E/U" in it. Anybody know anything about that?

Anybody know anything about that graphite like stuff?

Date: Thu, 30 Nov 2000 09:51:14 -0500
From: rbussier@lexmark.com
Subject: Re: [R-390] TV-7 problem

Barry, hi. I was reading your post of the work done on your TV-7. Allow me to speculate on the 'black stuff'. This was probably conductive grease. At IBM we used some of that stuff on a rotating (medium velocity) ground contact. The contacts were gold, but due to the necessity of having a good ground in the system (constant current), we had lots of problems with running different greases and running it dry. We contacted William Nye Co. and they suggested the conductive grease which solved our problems. It is jet black and it is full of carbon black (I believe) in a synthetic base. If memory serves me correctly, it was about $60 / one ounce tube. It (like the Moly based greases) are messy to use. The particle size of the conductive particles is so small, it gets into your pores and is tough to get out..... Hope this helps.

Date: Thu, 1 Feb 2001 22:51:18 -0800
From: keith <khgrant@ix.netcom.com>
Subject: [R-390] Tube testers

I'm a new owner of a R390A and have been in the process of getting working. I've recapped all but the RF module so far. I've found a number of bad caps so far; it operates much better already. Now that I've gotten this far, my thoughts are turning to tubes and tube testing. I get the impression that most of you have some type of tube tester at hand to check your babies? What type of tester should I consider getting? Which ones are good (or bad). Should I look for one of the military issue TV series or something else? I would rather not invest as much in a tester as my radio. What tester would serve my needs?

Date: Fri, 2 Feb 2001 06:05:39 EST
From: G4GJL@aol.com
Subject: Re: [R-390] Tube testers

I think the radio itself is the best tester. Use well worn tubes in the PTO, BFO and RF stages.

Then juggle what remains in the IF to get the least noisy tubes closest to the Antenna. I always use brand new tube as a control, to ensure that I am not unwittingly reducing the sets performance as I move the tubes around. Sometimes the control gets left in the set as the weakest tube is rejected. Sometimes you will find that the tubes in the set, when re-arranged give adequate performance. BTW "adequate" could mean acceptable, audible, to specification, contest grade, etc etc, depending upon your personal criteria.

At the end of the day, it does not matter what measurements on a 30 year old(+) tube tester tell you. You cannot connect an antenna and speaker to a tube tester! Only performance in the real radio counts!

Date: Fri, 2 Feb 2001 06:43:42 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Tube testers

As they say in the Hertz commercials "Not exactly"

> I think the radio itself is the best tester.

Expensive way to test for shorts. If you try a tube and the radio smokes -- discard tube. Also why you do the shorts test on a tube tester before the quality. Replacement multivoltage transformers for TV-7's and Hickok commercial testers are not on the rack at Radio Shack.

If you don't want to spend the prevailing prices on TV-7's, TV-2's, TV-3's, the better Hickoks, you can find a usable less popular "sleeper" like a Precision 10-12 or 6-something, which have some support on the net. There are a number of B&K's that are good, and even an RCA version of the Cardamatic. All can be had for under $100.

Tube testers can be fun, too. You look up the settings in fine print in a book or roll chart (extra fun), then set all the switches, bias or shunt and check 'em twice. Plug in the tube and wait a few seconds for the glow, step through the shorts test. Good? OK, then the moment of truth -- the quality test. If you've got the time, the gas test too. Be sure to tap the tube on the shorts test. H'ray, we have a winner! Sometimes, it's even more fun than playin' the radios -- hollow state in its essence.

PS -- with this post I may have driven the price of tube testers up another 20%. Arghh!

Date: Fri, 2 Feb 2001 07:08:38 EST
From: G4GJL@aol.com
Subject: Re: [R-390] Tube testers

I agree, Barry. Good Point. I stand by my post regarding a set which hears noises, but doesnt perform to spec. BTW My collection of boxed 'control' tubes on the shelf made it through a tube tester check a few years ago. I do actually have (and occasionally use) a NATO spec Mullard manufactured CT160 Tester, Valves, Electronic.

Date: Fri, 02 Feb 2001 09:36:17 -0500
From: Al Solway <beral@videotron.ca>
Subject: Re: [R-390] Tube testers

I went through the same problems with my first R-390A over the past 7 months. I got lucky last fall and picked up a Hickok Model 600A, less cover, at a local ham fest for $20.00 CDN here in Montreal. The fair market value should be about $125CDN. Cleaned it up a bit, made some adjustments and now it works fine. Compared performance with a friends TV-7 with good results. The Model is not the best Hickok but for my purposes is good enough. For prices I used e-Bay as a baseline for cost, high end price and max. to pay. See this WWW site it's the best you will find on Hickok tube testers.
http://www.Owned.org/~hstraub/hickok.htm

Date: Fri, 02 Feb 2001 09:44:23 -0600
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Tube testers

The very best tube tester for your tubes is the radio itself. No kidding.

Date: Fri, 2 Feb 2001 07:03:34 -0800
From: keith <khgrant@ix.netcom.com>
Subject: Re: [R-390] Tube testers

Thanks for everyones response. I'll try some tube swapping in the rig. I'm also going to keep my eye out for a tube tester. It appears that TV-7's are pretty common. Can someone summarize the differences between the different models in the TV series? Do any of them have transconductance? I've heard of TV-2's and TV-10's as well. I'm not looking for a collectors item, just a good quality box.

Date: Fri, 02 Feb 2001 10:51:05 -0500
From: Al Solway <beral@videotron.ca>
Subject: Re: [R-390] Tube testers

My experience with the my first R-390A with tubes and testing has been a combination of both approaches. V204, a 6C4WA, tested very bad on my Hickock 600A. I did not replace any of the tubes after testing. During sensitivity

improvement testing V204 was replaced which resulted in a 10db improvement. V501, a 5654/6BA6 had tested good but when replaced resulted in about a 3dbv improvement. V506, a 5814 had tested good resulted in the diode load voltage increasing by about 30% and a slight decrease in sensitivity. The original tube was used. During my days in the RCAF as a heavy Radar Tech. tube testers were seldom used. For routine problems, like low MDS, the only reliable and efficient way to correct this problem was tube replacing. For the occasional difficult problem, tube testers were used to give an indication of where the problem was, tube or other component. BTW tube replacement was real pain with those #$@&*% stuck IERC tube shields. Enough of the Bull for now.

Date: Fri, 2 Feb 2001 12:07:11 -0500
From: rbussier@lexmark.com
Subject: Re: [R-390] Tube testers

I agree that the best tube test, is use in the device under discussion. It is more useful in receivers, however. Swapping tubes in a cap tester or other piece of test gear may not show you anything meaningful. I bought a tube tester because it allows me to cull the duds from some lots I have obtained. You can find some great buys if you look around. Every piece of tube gear I obtain, gets all the tubes tested during the cosmetic restoration. The ones that are open/shorted, or otherwise nfg are pitched. I do this on tubes I receive from RF Parts, AES, etc. When the spares are about to go back into the device, they make another trip through the tube tester and then into the device. Because of the close confines in some of our beloved BAs, its not a whole lotta fun (or is it? naw, it's not) to swap a dud into place. Although tubes are still fairly cheap, you can buy older pieces of test equipment loaded with them, for next to nothing.....

Date: Fri, 2 Feb 2001 14:13:23 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] Tube testers

TV-7/D is a handy size and more than adequate for most purposes. I like using mine. Prices are getting a bit out of hand, though. :-(

Date: Fri, 02 Feb 2001 14:40:23 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Tube testers

I'm pretty well fixed as far as tube testers so I have to disagree with you on that, sorry.

>Use well worn tubes in the PTO, BFO and RF stages.

Aged but still pretty hot tubes are a good idea for the BFO and VFO, yes. I never install new tubes in these locations. I have to disagree about the RF stages though. There's nothing like a new "hot" 6DC6 in the R-390A. Ditto for the 6BZ6 and 6AN5 in the R-1051 series.

>Then juggle what remains in the IF to get the least noisy tubes closest to the antenna.

You've brought up an interesting idea here. I've never bothered to test tubes for noise other than tapping on them and looking for either the shorts light to flash or the meter to drop in the tube tester. Anyone have a good method to actually test tubes for noise. I don't mean loose elements or microphonic etc. I mean "normal" integral "noise". We know that it varies from tube to tube. I've never tried it but what about using a scope on a tube while in the tube tester?

>At the end of the day, it does not matter what measurements on a 30 year
>old(+) tube tester tell you. You cannot connect an antenna and speaker to a
>tube tester! Only performance in the real radio counts!

True but that 30+ year old tube tester can alert me to shorted elements in the tube or gas, etc. before I install it in the receiver. I've found that the gas test is important and often overlooked by people. I've had some really quirky problems over the years that ended up being gassy tubes. Especially in the AGC circuit of the R-390A.

Date: Sun, 11 Mar 2001 14:38:06 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] TV-3 & TV-10 tube testers update

The data collection continues for the TV-3/TV-10 "knowledge of the ancients" project...

I just updated my TV3/TV-10 page at: http://www.acadiacom.net/nlee/tv-3&10.html with the data I have accumulated so far and what I'm still looking for. I've laid out the basic design for the TV-3/TV-10 settings data file. It will be very similar to the ones I've done in the past for the TV-2, TV-4, TV-7, and I-177 series testers.

I suspect that there is published settings data a lot later that what I have access to so I'm waiting before I start typing everything in so I'm still looking for more settings data before I start on the file. The latest roll chart that I have is May of 1966.

It also appears that all of the TV-3 and TV-10 series models were different from each other, mechanically and electrically. When I first started this project, I had

zero experience with the TV-10 series and assumed that there would be minor differences as there are between the various models of the TV-2, TV-7, and I-177 series, but it appears that the differences are much greater than that.

I'm very curious about just how many TV-3 and TV-10 series testers were built. They're scarce as hell in my neck of the woods and it's very seldom you see one advertised for sale anywhere across the nation. There isn't a whole hell of a lot of data known on these models as far as production numbers. I suspect that the total production numbers are probably much much lower than the I-177, TV-2, and TV-7 series.

I'd appreciate hearing from any of you that own TV-3 or TV-10 series testers along with the information that is on the nomenclature tag. We're attempting to put together a list on these models with high SN's, etc. for each of the contract numbers.

What I need is the model, manufacturer, who built the meter along with the info off of the meter face, contract number, and serial number. Any addition info like date codes off of the internal components etc. would be a nice plus.

So far, I know of the following contract data for the TV-3 and TV-10 series. Let's fill in the blanks. :-)

TV-3/U nothing known

TV-3A/U nothing known

TV-3B/U by Hickok with contract number of NObsr 52672

TV-3C/U by Jetronic with contract number of NObsr 59586

TV-10/U nothing known

TV-10A/U by Hickok with contract number of NObsr 71284

TV-10A/U by Hickok with contract number of NObsr 71374

TV-10B/U nothing known

TV-10C/U nothing known

TV-10D/U by Western Reserve with contract number of 85308
SN A4 is in my possession. Any non prefixed SN out there?
What about higher SN's?

TV-10D/U by Western Reserve with contract number of 87455

Rather than clog the list, please email your responses to me. The data will be posted on my TV-3/TV-10 page as I compile it. I'm still looking for a few people interested in proof reading the settings data file as I put it together. I'm going to give it about another month and see if I can track down some later data. I've still got a few things to wrap up on the TV-4 series project in the meantime.

Date: Fri, 06 Apr 2001 20:07:23 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] TV3 and TV-10 tube tester updates...

Updates have been made to my TV-3/TV-10 page at:
http://www.acadiacom.net/nlee

Well, I've got a thousand lines of settings data typed in so far and am only up into the 6Exx numbers. This is going to be one hell of a list of settings data for the TV-3 and TV-10 testers when it's finished. I've also added some info on some modifications including the meter protection modification that it well worth doing to your TV-2, TV-7, I-177, etc. Cheap and it greatly decreases the odds of frying a meter movement. The contract number list for the TV3 and TV-10 series is shaping up but I still need additional information as far as high and low serial numbers. Also, I'm still in need of any published settings data for the TV-3 or TV-10 dated later than May of 1966.

Date: Wed, 5 Dec 2001 02:14:04 -0800 (PST)
From: MICHAEL OBRIEN <mikobrien@excite.com>
Subject: [R-390] tv-7/u problem and ca-4 tube data

<snip> Now for the problems on my tv-7/u when I do the range check (b to c) the meter goes off scale (past 120) also on some tubes (6v6, 6L6 etc) on range C any ideas ? Does any one have a copy of setup and tube data for the hickok ca-4 adapter to be used with the hickok model 600 tester. Ihave the model 800 data sheets for the ca-4 Does anyone know if the data is the same between the 600 and 800 ?

Date: Wed, 5 Dec 2001 08:20:00 -0800
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] tv-7/u problem and ca-4 tube data

>Now for the problems on my tv-7/u when I do the range check (b to c) the
>meter goes off scale (past 120) also on some tubes (6v6, 6L6 etc) on range C any ideas ?

Get a schematic; you won't get anywhere without one. I don't know the TV-7 specifically, but I do know the 600A, and most of the Hickok designs are closely

related. From your description, the meter is off cal or more likely, the plate supply is out of balance. The 600A applies 120Hz pulsating DC to the plate, and 120Hz pulsating DC bias to the grid with a little bit of 60Hz AC superimposed. The meter reads the difference between one plate current phase and the other. If the circuit's balanced, the tube's raw plate current is nulled out and the only thing that shows is the plate current change due to the AC grid signal. If you're reading high with tubes that pull a lot of DC plate current, the circuit's out of balance. My guesses:

(1) resistors in the range switch,
(2) the shunt pot and associated 12 ohm or so resistor,
(3) the 83 or 5Y3, or
(4) a bad 83 plate winding in the transformer.

When you test the 83 or 5Y3, it's very important that the two plates have the same emission. By the way, if the TV-7 is like the 600A, you can pull them out and test them in the same tester; the RECT test does not use the rectifiers.

The Hickok 800A is a 600A with a different nameplate. When they made the 8000, there was so much outcry (it couldn't test any of the older tubes, including its own, without an adaptor) that they were forced to revive the older model.

Date: Sun, 03 Oct 1999 14:38:51 -0400
From: "Wm. L. Townsend" <wlt@tesnet.com>
Subject: Re: [R-390] Yeah! I just got me a URM-25/D!!

I think you'll find the URM-25D to be pretty nice. I think it's hard to beat for the price. The only problem is you will need some serious biceps if you change bands a lot!

One thing that's worth checking though is a couple of coupling capacitors.

In particular, C135 and C136. These are in series between plate of the 6AG7 output buffer and R130 which feeds the attenuator. The B+ to the 6AG7 is about 220v so if these capacitors leak much you can get lots of current through R130 (499 ohms) and the attenuator. This is similar to the effect you get in an R390A when C553 shorts except you get a whole lot more smoke with a URM-25D!

C136 gets shorted by the switch to the left of the meter when you're in the 10-300kc position so in that case all that's between B+ and the attenuator is C135 and R130.

My generator had a shorted C135. Everything was fine - I had used the generator for probably a year with no problems. One day I set the switch to the 10-300kc

position. It made a nice smell as R130 went up in smoke. Fortunately, R130 went open and saved the attenuator!

You can check for shorts in these capacitors by looking at the dc voltage coming out of the RF Output BNC. Set the attenuator to X10K. Also set the 'SET CARRIER TO 10' pot fully counterclockwise when you do this. This kills the oscillator and keeps you from seeing 20-30 mv you may get from from the meter rectifier if there's any RF present.

Start with the X-Mult switch all the way clockwise. There should be no dc voltage on the BNC. It's unlikely that you will see any DC in this position, because both capacitors would have to have failed (they're in series except when C136 gets shorted in the 10-300kc position). Assuming that's OK, if you rotate the switch counterclockwise there should still be no voltage in any position. If you see DC in any position either move the switch to a position where there's no DC or turn the generator off REAL QUICK! It takes a few seconds to really roast R130, and by the time you can smell it the damage is already done. DC when in the 10-300kc position indicates a bad C135. This test won't really check C136 unless C135 is also bad since the two are in series.

If you need to replace C135 plan on spending a few hours - it's a real pain to disassemble the generator enough to get at it...

I'm not sure whether this is a common problem with the URM-25D - I've never heard anyone else mention it - but it's easy to check.

Date: Sun, 3 Oct 1999 16:40:07 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Yeah! I just got me a URM-25/D!!

> > I suspect a problem with the attenuator, I only get a good output on the X10K and X1K settings, other settings look like noise on the scope.
>
> If the voltage looks about right on those ranges
> (with a 50 ohm load the peak voltage on the scope ought to be 1.414 times
> the meter indication - the meter is calibrated for RMS) and then somebody
> may have keyed a transmitter into your attenuator when it was set to
> one of the lower ranges. This would probably have fried some of the
> resistors in the attenuator.

It HAS to be terminated with the 50 ohm load, which I don't have yet. I opened the attenuator and checked the resistors, they measure OK. I will try it again with the proper load, when I get it, it will probably work right then.

> The RF output should be a fairly clean sine wave.

> Mine has some distortion on the negative peaks. I don't know
> whether this is normal - probably not, but it isn't too bad so I've never
> worried about it much.

Mine shows distortion along the sine wave, it just makes a wide trace, at a higher sensitivity setting one can see harmonics.

> The attenuator is easy to take apart. The resistors
> are small - like maybe .25w and appear to be metal film. They will
> take quite a bit of abuse before they change value, so if one looks
> burned, measure it before you give up.

I think, after seeing them, that 0.25 watts is optimistic. They'd be tough to change. Interesting that the manual says to use a "hot" soldering iron to minimize damage. I see the electrolytics that you mentioned. I mean, I just barely see them. Just how does one go about changing them? That module has to come out of there, is there a tried and proven method? There's a BIG one w-a-a-ay down in there near the bottom.

> Fair Radio used to sell the attenuators for $20, or so. I don't know whether they still have them.

I'll find out.

> If you have to rebuild it, finding resistors is going to be interesting...

Getting them in there is, too!

Date: Sun, 3 Oct 1999 19:31:53 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Yeah! I just got me a URM-25/D!!

Got 'em, Roy! Just hadn't gotten to reading them yet, I see what you're talking about, they're as good as the manual, big help. But taking the Buffer/Amp out still looks like a bear. This unit was built, I think, in 1962 and still has the original tubes in it. Of course the inside looks new and it seems to have been taken care of, except for having had its rubber feet removed. I'm wondering if the caps are going to be a problem at all, I see NO Evil Caps; i.e. Black Beauties of Death, etc. Just electrolytics.

Date: Tue, 5 Oct 1999 19:15:43 EDT
From: SBJohnston@aol.com
Subject: Re: [R-390] Yeah! I just got me a URM-25/D!!

>It HAS to be terminated with the 50 ohm load, which I don't have yet.

You can use a BNC T connector and a 50-ohm BNC terminator as intended for 10Base2 "thin-net" ethernet computer networks. Radio Shack has them, believe it or not.

Date: Mon, 11 Oct 1999 15:52:17 -0500
From: "A. B. Bonds" <ab@vuse.vanderbilt.edu>
Subject: Re:[R-390] URM-25/E and URM-25/F

I'm not so convinced of getting that low a price. If one looks at Fair Radio, theirs are running around $100 or even slightly more. I'd rather put $100 into a URM25x than four times $25 into Eico 324s or the like..... As for what goes wrong, the caps in the audio oscillator are often flaky to the point that the oscillator shuts off after warmup. It's easy to replace 'em (there are four).

Date: Mon, 11 Oct 1999 16:43:12 -0500
From: Keith Heitzmann <kk5fe@gs.verio.net>
Subject: Re:[R-390] URM-25/E and URM-25/F

I agree with this. Most of the ones that I see are around $75 to $100. I bought mine for $75 shipped and I thought I got a good deal. Of course when I got it I saw why the guy was so generous with the shipping. He shipped it without a box!!! Thats right! Thank God it had the cover and was intact and in very good shape when it arrived.

Date: Mon, 11 Oct 1999 19:00:30 -0500
From: Phil Mills <plmills@attglobal.net>
Subject: Re: [R-390] URM-25/E and URM-25/F

I bought my last one at a hamfest 2 weeks ago for $50...it was in fairly good shape and had some of the accessories that go in the lid. Turns out it works well and is extremely well calibrated with no work on my part. Some advice though.....if you want a working signal generator, do not get hung up on the accessories in the lid being missing. If you have a manual, you will discover that most of them are just a resistor or a resistor and a capacitor and could easily be homebrewed for a few dollars each. This is a good unit in whatever flavor...I'd suggest you look

around for Dallas Lankford's notes on restoring one if you get one that is not up to par.

Date: Mon, 11 Oct 1999 19:10:19 -0500
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] URM-25/E and URM-25/F

Where might one find Dallas Lankford's notes on the URM-25? I've not found them on the internet anywhere.

Date: Mon, 11 Oct 1999 21:49:32 -0400 (EDT)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] URM-25/E and URM-25/F

Dallas' URM-25* notes are in the Hollow State Newsletter. If I'm not mistaken, all the back issues are still available at a very reasonable cost. Lots of good articles on the R-390* as well.

Contact:
Ralph Sanserino
P. O. Box 1831
Perris, CA 92572-1831

Date: Tue, 12 Oct 1999 07:07:57 -0500
From: "Jerry G. Kincade" <w5kp@swbell.net>
Subject: Re: [R-390] URM-25/E and URM-25/F

Second that motion. I bought the complete back issue set of Hollow State Newsletter, and its the best few bucks I ever spent...

Date: Wed, 22 Dec 1999 14:38:08 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] AN/URM-25D capacitors

No fancy equipment needed at all. If you use the digital multimeter in the *voltage* mode, it will indicate very low currents. Put it on the scale high enough to measure the voltage of the power supply you have. Lets say that is the 1000 volt scale. The input impedance of the meter is likely to be 10 meg-ohms (you should check this). So, if it reads one volt, that means one tenth of a microamp. Just

hook the capacitor from the DC supply to the plus lead of the voltmeter: (the other lead of the voltmeter goes to ground, or negative of the B+ supply) Watch the voltage decrease down from some high value toward zero as the capacitor charges up. When it gets done decreasing, you have your leakage current in tenths of microamperes. The actual voltage on the cap under test is the difference between the supply voltage and the voltmeter indication but that likely will not matter at all. If you want to measure the current in microamperes, just put a one meg-ohm resistor in parallel with the voltmeter. (11/10 megohm for better accuracy)

Newly made film caps will measure nearly zero. Old leaky paper caps will often measure half of the supply voltage or more.

Cap - eat emptor.

Roy
Who has two SP-600's and two URM-25's waiting for new caps.

Date: Sat, 1 Jan 2000 12:18:01 -0500
From: km1h@juno.com
Subject: Re: [R-390] Signal generator connection questions

Hi Jerry and the group, woke up this AM and found the planet still in one piece.....
I use both a URM-25D (with the complete MK-288 accessory kit) and HP-608C for boatanchor and most HF shop work.

Using a lab grade step attenuator (Daven 651-50) and an ancient Ballantine 300 audio VTVM I find that accurate, repeatable measurements down to the -138dBM level are possible. Leakage is pretty well eliminated by the use of some surplus HP 50 Ohm cables. Equally good results are had with some surplus DEC (Belden) 50 Ohm double shielded, extra flexible, network RG-58 size cable.

I have also found that clean BNC connectors with no tarnish are necessary for maximum performance. I have not tried RatShack or similar import connectors.

Is the unbalanced input a nominal 50 Ohms? Has anyone ran a network analyzer plot? I find no real info in the depot manual. Also, I would think that the purist could easily whip up a 50 to 125 Ohm balun if that is the better input choice and if the URM-25D MK-288 kit is not available.

Date: Sun, 2 Jan 2000 01:05:59 -0800
From: "Glen Galati" <eldim@worldnet.att.net>
Subject: [R-390] Mk-288/URM

Speaking of the MK-288 Accessory Kit! Does anyone know if there is a separate ArmyT.M./NAV-Ships/USAF T.O. for this item ?? Equally good results are had with some surplus DEC (Belden) 50 Ohm double shielded, extra flexible, network RG-58 size cable. I have also found that clean BNC connectors with no tarnish are necessary for maximum performance. I have not tried RatShack or similar import connectors..... Is the unbalanced input a nominal 50 Ohms? ....

Date: Fri, 07 Jan 2000 09:35:15 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Signal generator connection questions

>I use both a URM-25D (with the complete MK-288 accessory kit).....

Not a very common kit. ;-)

>I built a DA-121U 50/120 ohm matching adapter a while back using an extra >URM-25F adapter can.

What other adapters are in the MX-288? I'm not really interested in the cabling or coax adapters, just the cans.

>find that accurate, repeatable measurements down to the -138dBM
>level are possible. Leakage is pretty well eliminated by the use of
>some surplus HP 50 Ohm cables.

I've found that one of the best things that anyone that plays with very low signal levels can do for their URM-25* is to replace the coax of the three jumpers. Ditto for the internal piece of coax that connects to the attenuator pad. I suspect that people using the 30 and 40 year old original coax is one of the things that led to the bad reputation of the 25*'s when dealing with very low signal levels. I figure that not only is the stuff old enough to vote, but it's probably been bent and flexed a jillion times. It's amazing how much debris and oil film, etc can end up inside of the attenuators in the URM-25*'s. I've also seen contacts in them that weren't adjusted right or where dirty and would have measurable resistance levels. Some as high as 30 ohms of so. Not good for accuracy. ;-(

>Equally good results are had with some surplus DEC (Belden) 50 Ohm
>double shielded, extra flexible, network RG-58 size cable.

Interesting. I never even considered trying any of the network cable.

>I have also found that clean BNC connectors with no tarnish are
>necessary for maximum performance. I have not tried RatShack or similar import >connectors.

As many surplus military and high end commercial connectors as there are on the market, it's not work the gamble.

Date: Fri, 7 Jan 2000 20:51:42 -0500
From: km1h@juno.com
Subject: Re: [R-390] Signal generator connection questions

> When I bought my URM-25F and 25G, they both came complete with
> covers and all of the adapters, cables, fuses, etc.
> The MX-288/URM kit didn't come out until the 1960's or 70's.
> The Navy version lists all the cover mounted items as part of the 25D, not an
>accessory.
>That is correct. They were shipped together along with two copies of the tech
>manuals. I wonder what happened to all of the manuals? ;-(It took me ages
to track down originals.
> >CX-1363/U Test Lead (actually a can with 2 BNC connectors)

Actually, one BNC connector and two leads with alligator clips. If you run into one of these, make sure that you replace the blocking capacitor inside of it. If it's leaky, you can smoke the attenuator in the signal generator which is next to impossible to track down the resistors for. It is included with mine, tnx for the heads up.

> >UG-684A Connector adapter (BNC one side, 1/4" phone jack the other)
> One of the URM-25D contracts, NObsr 75083, came with an additional
> adapter, the CN-530/URM-25D which was used to match the old 70
> ohm input WWII RBB/RBC type receivers that use the concentric style
> coax connectors. A similar adapter, the CU-408/URM-25F was supplied
> with all of URM-25F contracts. It's handy of you mess with the WWII stuff.

I worked on the RBA/B/C series for many years along with the 25D. I liked those sets. Hated the later SRR series and the URC-32, very unreliable, always crapping out on the mid-watch! Also the damn Model 15 TTY clunkers when they switched to 100 WPM gears for the new Crypto units. Finally replaced with 28's.

> >I also have 8 pages of notes that Dallas Lankford sent me in 1988.
> A large SASE gets them.
>
> I already have them. I wish I'd have had them when I received my
> first 25D, it would have saved me a hell of a lot of trouble shooting to find the bad capacitors. The capacitors that Dallas said to change. <grin>

Actually I had intended to copy the list which is why I mentioned the SASE; didnt want to get bogged down with 100 orders at .55 a pop! I'll copy this msg and see what happens. Maybe everyone already has the info.

> >You guys are getting me wound up...maybe its time to open up this

> beast and do it to it.
>
> You mean to replace the capacitors? It's well worth doing. About 5
> dollars of capacitors will eliminate a major chunk of the potential
> problems with the thing.

Dallas mentions that the Vitamin Q types do not normally require replacing. Why not....since they are also paper? Do they go bad in the 390xx ? Another comment he made in the cover letter was to change the AC power filter chokes with Miller 4622's; the originals were underated and overheated, splattering red gook inside the filter case.
>
> >Someone (forgot who....sorry) also mentioned going to TNC to
> improve the shielding integrity.
>
> With good coax, the BNC's are fine since you're only hitting a max
> of about 51 MHz.

I only use mine to about 10MHz anyway. Tried it once on 6M but drift was way too much. Use a HP-608C above 10 Mhz. Also have a GR-1025A Sweeper/Generator which is a real fancy piece of gear. I really appreciate the low phase noise from these BA's as compared to several of the early synthesized gear. They work just fine with my regular station rice box Kenwoods, etc. and various VHF/UHF xvtrs. Some day I may break down and get a HP-8640B.

Date: Fri, 07 Jan 2000 21:25:24 -0500
From: "Randall C. Stout" <rcs1@sprintmail.com>
Subject: [R-390] HP 8640B questions

A couple more signal generator questions: The HP 8640B is listed as going down to 0.5MHZ, but is there enough overlap to give 455Khz? One of the options for the 8640B allows audio range freq. as well, and I assume that would be useful for audio stage tests. I have a HP 606A, which seems to work well for the freq. range needed for the R-390a. I know the tech manual recommends using a HP-608 for freq. over 10MHZ. Is this just for the URM-25, or is the 606A too unstable above 10MHZ too? I really liked the discussion about the possible sources of 'noise' in gear. It puts it in perspective, that for most applications, the caps are no where near the limiting factor!

Date: Fri, 7 Jan 2000 21:45:30 -0500
From: km1h@juno.com
Subject: Re: [R-390] HP 8640B questions

> The HP 8640B is listed as going down to .5MHZ, but is there enough
> overlap to give 455Khz?

The HP catalog states that it will go down to 450KHz.
>
> One of the options for the 8640B allows audio range freq. as well,

While at National they decided to replace the old GR-1001A's with the HP-606A. What a disaster with drift. I dont remember the details but HP replaced them with either a B or made changes to the old ones. The replacements were quite nice and drifted less than the old GR. I also use a HP-608C for above 10MHz and find it acceptably stable when warmed up. The attenuator is VERY accurate and leakage is nil when used with good cables. I use it a lot to test/align HF xcvrs for MDS in a 500Hz bandwidth and also VHF xvtrs. Some day I may break down and get a 8640B myself. Ive used them many times at work over the years and they are nice. IMO, stay away from the early synthesized sig gens; phase noise is horrible for weak signal work.

Date: Sat, 08 Jan 2000 07:22:49 -0600
From: "Jerry G. Kincade" <w5kp@swbell.net>
Subject: Re: [R-390] HP 8640B questions

My mil version 8640B (AN/USM-323) will reliably go down to 427 kHz with excellent stability, but only if I let it warm up for at least 15 min or so before trying it. Before that time, it simply drops the output (and the display) to zero below about 475 kHz. I use it with no problems in R-390/SP-600 alignments at 455. I do not, however, trust my unit's display (last two digits are a bit flakey after warmup), so I always "T" the output it to my HP-5328A ovenized counter during use. A good sig gen, my only major gripe is its noisy cooling fan, likely due to a zillion hours of use, but will fix that one of these days. Probably will need a replacement counter or display board one of these days also. I'm sure it will be fun finding one of those.

Date: Sat, 8 Jan 2000 08:43:17 -0500
From: "Warren, W. Thomas" <wtw@rti.org>
Subject: RE: [R-390] Signal generator connection questions

> I've found that one of the best things that anyone that plays with
> very low signal levels can do for their URM-25* is to replace the
> coax of the three jumpers. Ditto for the internal piece of coax
that connects to the attenuator pad.

My URM25D is spread out all over the bench now being re-capped, so a very good time to ask where one gets good double shielded RG58 style coax and good connectors (like which particular BNC connector is the one of choice). Took a look with a decent web browser and see only Times EMR 200 that claims to be 100% coverage with two shields. Is that an appropriate coax or is there another suggestion? Also thought I saw someone who said he'd bought some surplus double shielded HP cables. If they're available, where? Interestingly enough with

all the electronics stuff flying around here in the Research Triangle Park area, we don't have a decent surplus store that I've found. Maybe somebody in Silicon Valley or Route 128-land can suggest a place.

> >Equally good results are had with some surplus DEC (Belden) 50 Ohm
> >double shielded, extra flexible, network RG-58 size cable.

Where does one find this stuff above?

> It's amazing how much debris and oil film, etc can end up inside
> of the attenuators in the URM-25*'s. I've also seen contacts in
> them that weren't adjusted right or where dirty and would have
> measurable resistance levels. Some as high as 30 ohms of so. Not
> good for accuracy. ;-(

Nolan, sure glad you mentioned the attenuator. I would never have thought of taking it apart. I've checked my URM25 against an HP 8405A vector voltmeter and find that the actual microvolt/millivolt output reading isn't particularly accurate (i.e, the URM meter says one thing and the HP says another). Sure would like to get this URM25 right before I button it up in a month or so (yes, I'm slow!).

Date: Sat, 08 Jan 2000 08:09:13 -0600
From: "John P. Watkins" <jwatkin9@idt.net>
Subject: Re: [R-390] HP 8640B questions

Hi All, I have the Mil 8640B (USM-323) and it will go down past 455Khz just fine. I was wondering if anyone out there has the schematic for the non-mil 8640B counter assembly? The non-mil units have a 7 digit display and can also be used as a freq. counter. My mil model has a 6 digit display and and no outside input. After looking into it, looks as if all that needs to be done is provide a relay with SMA connectors and an attenuator to provide the extra input. By the way, these are great sig gens. John WD5ENU

---Date: Sat, 8 Jan 2000 15:34:42 -0000
From: "Bill Coleman" <n2bc@stny.rr.com>
Subject: [R-390] Signal generator discussion

All the interesting chatter about signal generators has prompted this. A couple years ago I spotted a PC based generator, look here: http://www.bytemark.com/

A nifty gadget, DC to 54 Mc with resolution to less than 1 cycle (pls notice the boatanchor appropriate units). For years I have used a General Radio 1001-A combined with a freq. counter. Now I have a dedicated PC in the shop with the PC-VFO and full of all of my other assorted radio-related software. I run the PC-VFO's output through a 0 to 80 dB attenuator which was liberated from a junked HP generator. The attenuator is mounted in an available drive bay and the

generator output is available right on the front panel of the PC. It's pretty nifty to stick a frequency counter on the output, tell the PC-VFO to go to 455kc and read .455000 on the counter - lots easier than diddling the 1001-A's dial and holding my breath. It comes with some simple software, but I wrote a small program with a bit nicer interface and the ability to save lists of frequencies - so I can plug in the list of marker freqs for my favorite receiver alignment and jump around with the touch on the keyboard. It can also be made to sweep frequencies - this works nicely if you have a reasonably fast PC. I use an ancient 386-16Mc motherboard (that's a PC boatanchor now-a-days) & it's works great. I have no connection with these folks, just a happy twiddler

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Date: Sat, 08 Jan 2000 10:48:21 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Signal generator connection questions

The Times cable is probably good. Sit down before you get a price on it and appropriate connectors. I generally use RG-223 for critical needs. I had a large roll from Collins surplus, but I used it all, now I'm using the remains of a coil of it I bought either from Hosfelt or Mendehlson Electronics. I prefer crimped or Amphenol -FCP connectors because I think they get a better grip on the braid so it doesn't pull out. There is a much larger braid contact area compared to the standard UG connectors.

I was having troubles trying to use a coax cable between my home brew double shielded fixed output (0 dBm) generator and enough attenuation to get down to -415 dBm with imperfectly shielded receivers. Using no flexible cable, I was successful, RG-55 (previous mil spec double shielded RG-58 size before RG-223) leaked. One cable I grabbed leaked a lot. One end fell off when I applied Johnson's wire test... A sharp tug. If the wire stretches or the end comes off, it wasn't wire all the way through. A tough test, but quick.

Its clear that the fancier HP or Times or Andrew corrugated solid metal cables are probably better for measuring set up.

I found that the BNC connector and BNC cables and adapters leaked different amounts according to tiny position changes at 50 MHz on my signal generator. Most metrologists despise BNC for that reason, especially above 200 MHz.

The bayonet lock just doesn't anchor the mating parts well. TNC and N do much better about consistency. When I'm trying to achieve 145 dB of shielding I'm pushing the envelope!

Date: Sat, 08 Jan 2000 20:50:50 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: RE: [R-390] Signal generator connection questions

.....time to ask where one gets good double shielded RG58 style coax and good connectors

RF Connection
http://www.therfc.com/

The R.F. Connection
213 N. Frederick Ave. Suite 11-W
Gaithersburg, MD 20877
USA

Tech Support (301) 840-5477
Orders (800) 783-2666
24 hour Fax (301) 869-3680

email address: rfc@therfc.com

Call or send an e-mail. He knows what you need and has it. UPS stops there every day. I'm a happy customer I (especially since I can drop over there at lunch time.) He recently sold me a piece of cable marked: M17/84 - RG-223 Mil-C-17 Times Microwave Systems, 68999, AA-3413 It has two layers of silver plated braid shield and a solid silver plated center conductor. I'm going to use it to feed my 30L-1 from the 32S-3.

In the oddity category, I just got three BNC-type Tee connector blocks which are triax coax: that is they have a three conductors, one center and two separate coaxial shields. They are marked DAGE 95712 4972-1. The end with the bayonet collar is female in the center, and the sleeve ones with the bayonet pins has a center male pin. The center and intermediate coax are gold plated. No doubt these are for Ghz use and would provide excellent shielding but I have neither mating connectors, nor cable to make up leads. Any info on these much appreciated. Dage appears from a web search to be a UK company that got bought up in 1997.

One last note: if you are measuring very low signal levels and have your counter hooked up to the "High" output on the URM-25, or similar output on the later HP 606's, you are fooling yourself and your receiver.

Date: Sat, 08 Jan 2000 22:19:19 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Signal generator connection questions

> ..... He recently sold me a piece of cable marked:
> M17/84 - RG-223 Mil-C-17 Times Microwave Systems, 68999, AA-3413
> It has two layers of silver plated braid shield and a solid silver plated
> center conductor. .....

>
That's exactly the description of proper RG-223. Anything else is a lie.

> In the oddity category, I just got three BNC-type Tee connector blocks
> which are triax coax: that is they have a three conductors, one center and
> two separate coaxial shields. They are marked DAGE 95712 4972-1.....

I don't think the triaxial connector was intended for UHF or microwave. More for very sensitive instrumentation at DC and HF. It doesn't work with RG-223, needs the shields insulated from each other.

> One last note: if you are measuring very low signal levels and have your
> counter hooked up to the "High" output on the URM-25, or similar output on the later HP 606's, you are fooling yourself and your receiver...

On my HP 608F (that is better shielded than the TS-510 I used to use), I find its also important to have a shield cap on that high level output to approach 25 dB above the MDS of a good VHF SSB receiver.

Date: Sat, 08 Jan 2000 22:26:11 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: RE: [R-390] Signal generator connection questions

>One last note: if you are measuring very low signal levels and have your counter hooked up to the "High" output on the URM-25, or similar output on the later HP 606's, you are fooling yourself and your receiver.

Agreed, it would affect the calibration of the RF voltmeter circuit in the signal generator. The amount would vary with the "load" of the counter. Wait a sec. Come to think of it, I think that it would be more than just the normal load of the counter. Adding a second 50 ohm coax in parallel for the counter would totally change the output impedance of the circuit wouldn't it? If so, that could make a hell of an error in the calibration of the RF voltmeter circuit.

I've chatted with dozens of different people about the military URM-25* series in the past. Many of them use the thing pretty much "as they got it" and have never checked the calibration of the meter circuit.

Date: Sat, 08 Jan 2000 23:11:18 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Signal generator connection questions

> > One of the URM-25D contracts, NObsr 75083, came with an additional
> > adapter, the CN-530/URM-25D which was used to match the old 70
> > ohm input WWII RBB/RBC type receivers that use the concentric style
> > coax connectors. A similar adapter, the CU-408/URM-25F was supplied

> > with all of URM-25F contracts. It's handy of you mess with the
> > WWII stuff.

I've had my old RBC-2 since I was a teenager. I've been looking for an RBB series that was "local" for ages. They're too big and heavy to ship. I'm still looking for a couple of little doodads to complete my RBC-2 like two of the little metal dial glass retainers, one of the red fuse holder "caps" for the power supply, a voltmeter, a couple of knobs, and a few other little doodads. I could use one more of the old concentric coax connectors too. I don't know what happened to all of them. They were common as hell 25 years ago.

>Dallas mentions that the Vitamin Q types do not normally require replacing. Why not....since they are also paper? Do they go bad in the390xx ?

The old Vitamin Q's were probably some of the best constructed paper caps made. Oil filled and heramically sealed with glass and metal. Of all of the caps that I've removed from the various R390A's and modules, they failed the leakage test the least often. I'd still replace all of them in the receiver while you're "in there". Cheap insurance over the long haul.

When I did the audio deck on the EAC, I used some NOS Vitamin Q's that I'd been saving for some of the locations on the circuit board where I didn't like the way that the orange drops fit. I tested the hell out of them a little over their rated voltage and they were perfect. I even left them at full operating voltage on one of the PS's for a couple of days and then retested them. I guess that they aged well. The only deck that I'd even consider using NOS caps like that in would be the audio deck. It's about the easiest to remove. As much trouble as it is to remove the RF deck, only new over rated OD's are used there. It's not worth trying to save a dollar and a half and having to pull the deck down the line somewhere. Ditto for the caps in the IF decks on account of the amount of effort it takes to replace them in the first place.

Finding any NOS Vitamin-Q's any more is tough as hell. It seems that the golden eared audio crowd has discovered them. I saw some listed a while back at over three bucks apiece for 30 year old NOS ones. No thanks, I can buy 6 times as many new orange drops for that. ;-) They "sound" good. Hell, I can't carry a tune in a slop bucket, I could care less how capacitors or rectifier tubes "sound". <grin>

>Another comment he made in the cover letter was to change the AC power
>filter chokes with Miller 4622's; the originals were underated and
>overheated, splattering red gook inside the filter case.

Mine had already been relocated and replaced with updated parts. There was no evidence that the original ones had failed. Relocating them is a good idea. My URM-25D model has matching SN plates on the case, front panel, PS module, etc. Upon close examination, the big orange plate on the top of the cabinet showed that it was a URM-25G that had been over stamped as a D model.

One good thing about the G model is that the adapters that came with it had late design high quality dipped resistors that hadn't changed in value at all. The adapters that used conventional looking carbon composition resistors need to be checked for out of spec resistors.

Comparing the schematics and parts listings from the URM-25G and H manual, my D model is actually a G model with it's extra 12 volt transformer winding and a zener diode regulated filament supply for the oscillator tube. The power supply in the G runs noticeably hotter than the D model but doesn't drift as much with changing line voltage.

I'm looking for a copy of the schematics and parts listings from the manual on the URM-25 models later than the H.

Date: Sun, 09 Jan 2000 03:09:04 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] URM-25D stuff...

>.....to ask where one gets good double shielded RG58 style coax and good connectors (like which particular BNC connector is the one of choice).

I'm still using my little hoard of NOS King silver/gold teflon insulated BNC connectors that I picked up from a NASA auction. Exceptional quality but expensive as hell and cost prohibitive if you can't find them surplus. ;-(I started getting low on them a few years back and checked into their prices. They were well over twenty bucks apiece "retail". Some of them topped thirty dollars each. You'd stand a better chance of seeing hell freeze over than ever seeing me spend twenty dollars for a BNC connector. <grin>

Fair Radio used to have some real good deals on coax connectors. You might want to drop them a note and see. Surplus Sales of Nebraska had a really good price on NOS milspec type C connectors a while back. I think that they were three or four dollars each.

Oh, while you have the URM-25D apart, replace the male BNC connector that sticks out of the black aluminum box, J103, with one with a hex head base flange. Any time you remove the buffer amplifier subassembly you need to back that coax

connector out about 8 turns or so for clearance. The one that's installed from the factory has no hex head and is a pain to mess with. With the hex head, a wrench makes it a snap.

>Took a look with a decent web browser and see only Times EMR 200 that claims to be 100% coverage with two shields. Is that an appropriate coax or is >there another suggestion?

I thought that 98% was the minimum guaranteed shielding for all milspec RG-* rated coax.

>Also thought I saw someone who said he'd bought some surplus double shielded HP cables. .....

Ain't none of them there place like that in these here parts... ;-(

> > >Equally good results are had with some surplus DEC (Belden) 50 Ohm
> > >double shielded, extra flexible, network RG-58 size cable.

It might be worth checking with one of your larger local computer shops. One that does a lot of network work for businesses and schools, etc. Ease by there and talk to them and tell them that you're looking for odd lengths of either new cable (cut too short screwups) or some long runs of used cable that they've removed during site upgrades etc.

>Nolan, sure glad you mentioned the attenuator. I would never have thought of taking it apart.

I've disassembled both of mine, cleaned and adjusted the contacts, and lightly lubed the shaft and detents. Watch you don't loose the detents when you take it apart. Also, be very careful when you measure the values of the little 60 some ought ohm 1/8th watt resistors or the resistance of the contacts. It don't take much to smoke the resistors and you'll just about need a parts hulk signal generator to find replacements.

>I've checked my URM25 against an HP 8405A vector
>voltmeter and find that the actual microvolt/millivolt output reading
>isn't particularly accurate (i.e, the URM meter says one thing and the
>HP says another).

All of the resistors in the attenuator are 1% negative temp coefficient ones. The original accuracy spec on the meter is probably 2% or so of FS. The overall accuracy spec for the RF voltmeter circuit of the URM-25D is 10% according to the manual. Way more than close enough for any non-lab type BA use. Realistically, the difference between .9 and 1.1 uv when you're shooting for a precise 1.0 uv probably isn't worth worrying about.

The 10% accuracy spec seems on the high side for it. I suspect that it's rated this way due to a possible stack up of tolerances. If the meter is off 2% and each of the resistors in the attenuator are also at one end of their 1% spec, you could end up being a max of 10% off I guess.

If the resistors and meter are on the money, the accuracy potential should be a lot better than 10%. I know that both of mine are.

I removed, disassembled, and tweaked the calibration of the meter in my D model. It is exactly 100 ua at FS and was under 1% max error across the scale. The meter in my F model was off probably 10% and it's internal resistance was high. I had a spare meter that was within 2% so I swapped it out. Sooner of later, I'll either clean and recalibrate the old one or find another Burlington 100ua meter that I can swap the meter face with if the internal resistance problem isn't fixable.

All of the resistors in the attenuators in both the D and the F are within a couple of tenths of an ohm of their marked value. I'd guess that they're within less than a half of a percent. A few were only a few hundredths of an ohm off. Granted, a nice lab grade HP signal generator or an external Tektronix attenuator pad is going to be more accurate. Unless I luck into one locally at a good price, I don't really see a need for a more "high tech" signal generator for my needs.

>Sure would like to get this URM25 right before I button it up.....

Hell, I've been working at going thru the Collins R390A for well over a year. Maybe I'll finish it this year. <grin>

While you have the URM-25D apart, measure the values of all of the resistors that you can get to. Make sure that you check resistors in the modulation meter circuit. If R167, R168, R170, or R171 have drifted upwards more than 5% from their marked values replace them. Also, check R169, the meter calibration pot for the modulation meter function. It's a 2500 ohm carbon pot. If it measures much more than 2500 ohms between terminals 1 and 3, replace it too.

There are some other potential problems that can cause some hair pulling when you attempt to calibrate the RF voltmeter function. Check R129, the 100 ohm resistor that one end of is soldered to the back end of the 200K front panel BNC connector. It's probably out of spec from being soldered and unsoldered a few times. Since the 200X jack is used to set the output levels during the calibration procedure, you want R129 to be as close to 100 ohms as possible. If you have one that is slightly lower in value, like 99 ohms, use that one as a replacement. By the time it's soldered into place, it'll probably be 100 ohms. ;-)

Also, check the value of R130, the 500 ohm resistor that feeds the input of the attenuator. It's a film type resistor located on the buffer amplifier subassembly. It

should be 495 to 505 ohms max. It's another negative temp coefficient resistor so if it out of spec, you'll have to do some searching to find one.

If you run into problems not being able to adjust R172 high enough to get a full 2 volts out of the 200K jack when you're making the calibration adjustment, then R144 a 4.7K resistor has probably drifted up in value. Replace it with one on the low side of it's 4.7K value. It'll give you more adjustment. If that doesn't do it, check the 10K R128 between pins 5 and 7 of the 5726 tube to see if it has increased in value. If so, change it.

Date: Sun, 09 Jan 2000 09:45:49 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Signal generator connection questions

Nolan Lee wrote: .....Adding a second 50
> ohm coax in parallel for the counter would totally change the output
> impedance of the circuit wouldn't it? If so, that could make a hell
> of an error in the calibration of the RF voltmeter circuit.

That's not nearly the problem that putting +10 dBm into a piece of coax cable to radiate a bit and then go to the input amplifier of the counter where its boosted to 3 or 4 volts peak to peak square wave inside a single shielded (at best, probably not really shielded at all) box to radiate directly to the single shielded (at best) receiver input.

Date: Sun, 9 Jan 2000 11:32:05 EST
From: DJED1@aol.com
Subject: Re: [R-390] Signal generator connection questions

I think there are two problems with having the counter hooked up- the fist is that the hookup may not be adequately shielded and may radiate directly to the receiver. the second is that the loading of the counter may disrupt the output levels. I check the frequency on my URM-25, the disconnect the counter for those reasons. By the way, perhaps we should agree on the setup to measure the sensitivity of the R-390* so we can better compare who has the hottest receiver. I noticed that I've been measuring as if the radio had a 50-ohm input, and I should have been shunting the input with 100 ohms or so to comply with the URM-25 manual. Is it fair to say the a R-390 or SP-600 should always be measured with a 100 ohm resistor in parallel with the balanced input?

Date: Sun, 9 Jan 2000 13:04:22 -0500
From: km1h@juno.com
Subject: Re: [R-390] Signal generator connection questions

> I think there are two problems with having the counter hooked up- the
> first is .....

For general use with any sig gen that does not have a built-in sample port it is quite easy to build an external one in a shielded enclosure. Suitable circuits using broadband toroids, etc are in various ARRL and other handbooks. A suitable directional coupler of at least 10dB directivity should present negligible loading to the thru port. The actual coupled signal level is immaterial as long as it is sufficient to gate the counter. As has been stated on the list many times, shielding integrity is of paramount interest if you want to get down to the noise. The more items you add, the greater the chance of leakage. I've asked this question before but received no reply....What is the nominal input impedance of the unbalanced input of a 390A? Would it not make more sense to use that input for any coax based measurements? Any impedance adapters that use resistors to do the job such as the URM-25xx will add loss to the system. The manual goes into coupling methods in detail and also cautions about accuracy errors. I do not have any basic long wire or balanced feed antennas here. For most BA type of reception I use Beverages, coax fed multi frequency dipoles and verticals..

Date: Sun, 9 Jan 2000 13:04:39 -0800 (PST)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] URM-25D stuff...

I've seen URM-25 attenuators for sale on the shelf at Murphy's Surplus http://www.maxpages.com/murphyjunk Don't see them listed on the web page, but you can find the phone number there.

Date: Sun, 09 Jan 2000 13:32:26 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Signal generator connection questions

>That's not nearly the problem that putting +10 dBm into a piece of coax
>cable to radiate a bit and then go to the input amplifier of the counter
>where its boosted to 3 or 4 volts peak to peak square wave inside a
>single shielded (at best, probably not really shielded at all) box to
>radiate directly to the single shielded (at best) receiver input.

Interesting, Doc. I never even really considered it from that angle. That could very well make a hell of a difference. I think it might be worth making sure that even the BNC cap is installed on that 200K output of the 25D when not using it too from now on. I guess that most of us take it for granted that coax is fully shielded, when it ain't. ;-(

I always try to make it a point to never have any extra coax, test cables, adapters, etc. hooked up to anything that I'm not using at that very moment. I do this not so much to reduce clutter (fighting clutter is a lost cause on my bench) as to reduce the possibility of a repeat of a rather interesting experience that I had a long time ago involving an exposed alligator clip test lead, an HV power supply, a Zippo lighter, and me as a ground path. I could taste the fillings in my teeth. ;-(

Date: Sun, 09 Jan 2000 15:20:14 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] DA-121/U & sig gen stuff...

>I think there are two problems with having the counter hooked up- the fist is that the hookup may not be adequately shielded and may radiate directly to the receiver.

I hadn't really though of the possibility of this. I was concerned more with the accuracy of the RF voltmeter circuit.

> the second is that the loading of the counter may disrupt the output levels.

This one I though of. <grin>

>I check the frequency on my URM-25, the disconnect the counter for those reasons.

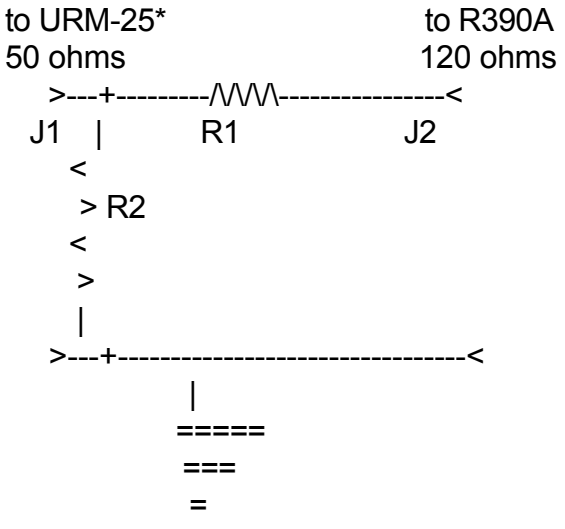
I have always disconnected the counter out of worry of a failed blocking cap or something similar failing and allowing B+ from either the receiver or signal generator to feed into the counter and puke it. I haven't had very good luck with counters and leave them connected to whatever I'm messing with as little as possible.

>By the way, perhaps we should agree on the setup
>to measure the sensitivity of the R-390* so we can better compare
>who has the hottest receiver. I noticed that I've been measuring
>as if the radio had a 50-ohm input, and I should have been shunting
>the input with 100 ohms or so to comply with the URM-25 manual.

Actually, other than for the sensitivity measurement of the R390A, the standard adapters that come with the URM-25D are more than enough to align the receiver.

It's simple enough to build one of the DA-121/U 50 to 120 ohm impedance matching adapters. I built mine in an extra can from a URM-25F that someone sent me. I've built the regular adapters before for a friend out of copper water pipe and end caps.
They worked like a charm and were probably better shielded than the originals.

Here's a rough schematic of the 50 to 120 ohm DA-121/U adapter:



R1 is a 100 ohm 1/4 watt resistor
R2 is a 68 ohm 1/4 watt resistor
J1 and J2 are male BNC connectors

Date: Sun, 9 Jan 2000 13:52:42 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Signal generator connection questions

As much as one of these leaks, why can't you just put the included antenna on the freq counter and read the leakage? Also, how does one set the frequency of the URM-25 D to 455 Hz "exactly", without a freq counter? I don't trust the dial that close and its a long ways from any calibration point.

Date: Sun, 09 Jan 2000 15:59:38 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25D stuff...

I wish that they were local to me. As common as it is for the resistors in the attenuator to be damaged I'd be hesitant of buying one without being able to check it out by measuring the resistance values across the output as it's switched thru all of the steps. There's a good chance that they were removed because they needed to be replaced. Even still, if they were cheap, they'd be worth picking up for the remaining "good" resistors. I have a spare one for my URM-25F but not for the URM-25D. The resistors in the attenuator for the URM-25D model are the same as the URM-25F, even though the attenuator itself is of entirely different construction. They're also the same as the ones in the URM-25G,H,J,L,etc. The earlier models like the URM25 and URM-25A used an output impedance of 53.5 ohms. As a result, the various adapters and the attenuator resistors are totally different values with the exception of the . I'm not sure about the URM-25B and URM-25C models since I don't have manuals for them but I've been told that they also had a 53.5 ohm output rather than 50 ohms like the later models.

Date: Sun, 09 Jan 2000 16:46:56 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Signal generator connection questions

> As much as one of these leaks, why can't you just put the included antenna on the freq counter and read the leakage?

You sometimes can, but you don't gain anything in controlling the signal to the receiver because the internal signal level in the counter is still a few volts peak to peak to run the logic. You can sometimes detect when the logic is counting (the gate is open) by the increase in signal radiated from the counter.

> Also, how does one set the frequency of the URM-25 D
> to 455 Hz "exactly", without a freq counter?

You have to interpolate from the crystal markers built in, or else with an external frequency standard, like an LM frequency meter (or BC-221) or by beating against an external 455 KHz crystal oscillator. These days the most convenient thing to do is to let the signal generator warm up a lot to stop drifting, connect the cable to the counter to set it to 455, then unhook the cable at the generator end, and cover the connector.

You can also get a calibration point at 450 KHz, probably by using a harmonic though it will be weaker. Once upon a time I worked up calibration points for a BC-221 with the mixing up into low microwave, and I found maybe half of them existed. Got me really fine calibration points at close intervals, good for a good score in the old ARRL Frequency Measuring Tests.

Date: Sun, 09 Jan 2000 17:45:29 -0600

From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Signal generator connection questions

>..set the frequency of the URM-25 D to 455 Hz "exactly", without a freq counter?

Hmmm, sounds like me after the hammer and shotgun episodes with a couple of previous counters.... :-) If you have a little digitally tuned receiver like a RS DX-440, etc. First tune it 10.000 MHz (or whichever one you can receive) and turn the BFO on. Zero beat the BFO with WWV. Now tune the receiver to 910 KHz and then zero beat the output of the signal generator to the receiver using the second harmonic of 455 KHz while you tune the signal generator. It'll get you more than close enough, probably with a few cycles. I got real good at harmonics for a while. :-) One thing that you need to remember. First, never use the "Set Carrier to 10" pot to raise or lower the output level of the signal generator. The output frequency varies somewhat as that control is moved. **You need to be real consistent at setting it to "10" each time you change the frequency of the signal generator with the main tuning dial.** You do this with the microvolts pot set to max. After you set the meter to "10", then you lower the output level using the microvolts pot.

Date: Sun, 9 Jan 2000 19:42:03 EST
From: DJED1@aol.com
Subject: Re: [R-390] Signal generator connection questions

The problem with the signal generator is that you need a much stronger signal to gate the counter, maybe 60 or 80 dB above the levels you want to test at. So you have, in the case of the URM25, a separate output port with a 2V signal. It's tough to shield that much signal to a level below 0.1 microvolt. I'll see if I can develop a consensus amongst the group on the impedance for the radios. I think you can always correct the measurement for the matching resistor effects.

Date: Sun, 9 Jan 2000 18:15:11 -0800
From: "Ed Zeranski" <ezeran@concentric.net>
Subject: Re: [R-390] Signal generator connection questions

When I was in the service , Navy, we used the URM-25 on a daily basis and as someone posted size was probably in the MilSpec. Ever try dragging an HP-608 up ladders on an old tincan to align URR-35/RED receivers? The '25 was used on R390*, 274s etc by using HS-30 phones to do a zero beat at the closest point then using the dial...maybe not great but as a 20 year old ET2 all we had. Checking the local 25F zero beat with a counter on Hi out was, well, dead nuts... Had not recently thought about the LM comparison though I should have as several live here, models 10, 15, 21 as well as some Army 221s and the QST/CQ articles on those back to W W II surplus days are archived. Back a sentence or three I mentioned URM-25(*) use in the early - mid '60s in the Navy. Those were used according to the basic instructions in the manual so maybe at 455Kc the

Navy figured IF bandpass, what the genny could do, and what was expected were close enough??? At the time the common shipboard F counter was a huge HP job with vertical strings of tube read out, can't remember the nomenclature, total pain so seldom used thus the radiation from a counter lead wasn't a problem. The 25F picked up at a swapmeet checked out OK but when I used it, being careful to monitor with a counter of course, I got the radiation to the test RX. Since have used the counter then taken it off or when testing at an even number..7Mc or such just use the zero beat. Didn't someone run an F measurement 'contest' a few years ago to duplicate the old ARRL tests? Last thing I need is another LM or 221 but can't pass one up when it goes for $5 and if not sold will hit the dumpster. Same for an Grertsch FM-3s, Lambkins, and Millen GDOs...old technology but just neat. Right now have an LM set up with RAK/RAL , TCS, and RBS...will have to drag over the 25F then play.

Date: Sun, 09 Jan 2000 20:20:15 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25D stuff...

>Maybe I'm missing something here, but what is so hard about replacing
>the 25D, etc attenuator resistors?

Physically replacing them isn't too bad. It's finding replacements that's the killer.

>Its been ages since I did one but if the old grey matter is still
>functioning there was room for the more recent film types.

There's not a whole bunch of room to work with inside the cavities of the attenuator of the D model. The design is totally different for the F model and it's a lot easier with more room. Actually, just about everything is easier on the F model. :-) The original resistors were high quality and stable 1/8 watt dipped and sealed deposited film carbon resistors of non standard values with a negative temperature coefficient. Tough as hell to find.

>Those are available in 1% tolerance and can be fine tuned to exact
>values with a diamond scribe.

I'm not sure of how stable they would be long term but that's an interesting idea. I'd imagine that sealing the resistor body with varnish or something would be a good idea to keep the humidity out and improve the stability a bit after massaging the value. I've never seen anything on doing this before. I'd like to hear from anyone that has information and experience with doing it.

>Even off the shelf values should be close enough for government work.
>Who cares if it is 499 vs 495 or 61.9 vs 61.8, etc?

Me, for one! <grin> If I wasn't worried about some degree of accuracy in my test gear, I'd be using one of my Conar 280's, or an Eico 322 or something similar for my primary signal generator rather than the D and the F. (Speaking of which, I could really use a copy of the manual for the Conar 280 signal generator.)

If I'm going to spend any time fixing up a piece of test gear, or a receiver for that matter, I'd like it either work as well as it did when it left the factory or better. Hopefully better. :-)

>Confused as usual.

Not at all. I guess that I'm just a little bit fanatical about some aspects of electronic gear. I doubt that anyone else on the entire planet spent several evenings measuring the resistance values of each of the wires in the main chassis harness of their R390A down to the thousandth of an ohm or checked the repeatability of the slug racks in the R390A with a dial indicator. I've spend untold hours dissembling and calibrating the meter movements in a lot of my stuff because they weren't as accurate as they could be. The fact that the paint is starting to wear off of the tuning knobs doesn't bother me at all. :-) I don't have a real big electronics hobby budget and a lot of the more modern an accurate test equipment that I'd love to have is way beyond my reach. I guess that I tend to overcompensate and try to turn some aspects of what I do have into the best that I can. I'll be honest with you though. Just knowing that I had replaced one of the resistors in the attenuator with an out of spec value would bother the hell out of me every time I looked at it.

Date: Mon, 10 Jan 2000 04:05:42 EST
From: Wn4i@aol.com
Subject: Re: [R-390] Signal generator connection questions

Can I give you my way to do it .....if you have a 455.000 khz Xal .... connect one side of it to the URM-25-D (I use a scope probe) and the other side of the Xal to the tip end of your scope probe....The 2 free ground leads together..... You might have to apply as much as the full 100.000 uv output depending on the sensitivity of your scope.....you will find the 455khz signal on the output of the xal as you tune the generator around the freq.

Date: Mon, 10 Jan 2000 05:08:26 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] Sig gen for checking crystals...

>Can I give you my way to do it .....if you have a 455.000 khz Xal....

Pretty slick bubba! If you were local, I'd buy you a bottle of beer. :-) Just for kicks, I fired up the 25F and the old Tek 547 and one of the counters and tried this to check thru some 200 KHz calibrator crystals that I had set on the side to be sorted

out for dead and off frequency ones at a later date. I weeded out the dead ones pretty quick and with a hell of a lot less effort than having to install them in the R390A.
All of the ones that worked would easily oscillate at 400 to 600 uv levels. The dead ones were deader than a hammer even at 100,000 uv volts. Now, how practical would it be to throw together a little crystal test chassis for determining the actual frequency of the crystals? Nothing real complicated. Say a 6.3 volt filament transformer and an octal socket for one of the plug in ovens and a conventional crystal socket for the "room temperature" crystals. I suppose that I could do it with just the oven socket and either switching off the filament transformer or just not plugging it in the wall for the ones that don't normally run in an oven. I could mount a couple of BNC connectors for the signal generator and scope connections. Looking at the specs for the different crystals used by the R390A, I see that some of them use a shunt capacitor of say 5 or 7 mmf, etc. Suppose that I mount a transistor socket or something similar under the open crystal socket and/or under the octal oven socket so that I can simply plug in the particular value capacitor that is recommended for whichever crystal that I want to test. Maybe it would be better to check the circuit that the crystal is used in in the receiver and use the capacitance value of it.

I realize that the frequency can be pulled to a small amount with capacitors, but would this be a reliable and accurate method for determining the actual frequency of the crystal down to maybe fractions of a hertz for low frequency crystals and maybe one hertz for the HF ones that I'd see in produce in the receiver itself?

Date: Mon, 10 Jan 2000 10:39:00 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Sig gen for checking crystals...

>Can I give you my way to do it .....if you have a 455.000 kHz Xtal.....

I use such a test jig for determining the center frequency of the series resonance and the Q of crystals that I might use for ladder filters. I built it with a connector that goes direct to the BNC on my scope input to give it an anchor.

I use a different test oscillator for testing crystals for oscillation, its faster than dialing up a series resonance. I copied the oscillator circuit from the Collins 821A-1 (250KW) transmitter and included what turned out to be a diode multiplier.

With a 100 pf variable in series with the crystal, I can move the parallel resonant operation around quite a bit. It has good output at 2m which was its original intent. Its built in a 4x6x2" bud box with cover and the round 9 volt transistor battery lasts decades. I do have a circuit of it here in a booklet that I put out for a radio club program so I could scan and e-mail it if desired. It runs overtone crystals on their fundamental because the oscillator is not tuned.

From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Signal generator connection questions

Works great to identify the SERIES resonance of the crystal. That may be the calibrated frequency but most crystals below 20 MHz are calibrated at a parallel resonance with 20 to 32 pf in parallel with the crystal. So the series resonance found this way is NOT NECESSARILY the marked frequency. There can be as much a 2 KHz difference between series and parallel resonance. Parallel resonance is found by the notch in the same set up.

Date: Mon, 10 Jan 2000 10:45:16 -0500
From: "JAMES T BRANNIGAN" <JTBRANNIGAN@prodigy.net>
Subject: Re: [R-390] Signal generator connection questions

> Also, how does one set the frequency of the URM-25 D
> to 455 Hz "exactly", without a freq counter?

Even with a counter connected, the URM-25D is REAL touchy at 455khz, and unless it is warmed up for a while it will drift. So, check your settings often. I'm refurbishing my CV-591. It needs audio caps and a new volume control. These are on order from Mouser and SSofN. BTW, I connect the AGC from the CV-591 to the R-390A. It works just fine.
---Date:
Mon, 10 Jan 2000 20:50:50 EST
From: DJED1@aol.com
Subject: Re: Re[2]: [R-390] Signal generator connection questions

Here's what I know: The nominal balanced input is 125 ohms. The original specs to which the nonA was designed called for 125 ohms plus/minus 15%, with no more than 20 ohms of reactance. The final acceptance spec for the production radios was 50 ohms to 375 ohms up to 16 MHz, and 100 to 700 ohms at frequencies above 16 MHz. I mention this because the only info I have on the unbalanced input is from the original spec, which may not represent the actual radio. We know the unbalanced input is high impedance (connected to the grid of the first RF tube). The original spec called for the unbalanced input to operate with antenna impedances from 1/10 ohm to 400 ohms of resistance, and 50 to 1000 pf of capacitance, which was to be tuned out with the antenna trimmer. I haven't seen any measurements, it would be interesting if someone can run some. I would propose that sensitivity measurements be made using the balanced input assuming 125 ohms impedance.

Although the test procedure in the spec calls for a 125 ohm resistor in series with the generator and radio, I think Nolan's setup is correct, because it provides the 50 ohm load for the URM25 generator and a 100 ohm load for the radio. The spec also calls for the unbalanced input to be fed through a 50 pf capacitor, implying a reactive input impedance.

Date: Thu, 20 Jan 2000 11:46:35 -0500
From: Mark Mohrmann <mohrmannm@mail.lsc.vsc.edu>
Subject: [R-390] AN/URM 25 Capacitor Replacement

The R-390A (EAC #386) restoration project has been temporarily put on the back burner, while I attempt to fix a bad step attenuator in my AN/URM-25D.

As long as I've got the signal generator apart I'm planning on replacing the capacitors suggested by Dallas Lankford. From what I can gather just by his notes without yet opening everything up, he suggests replacing:

C159, 162, 163, 165, 166, 167 Audio Subchassis

C130 Buffer Amplifier Subchassis

C155 Calibration Oscillator Subchassis

If anyone can suggest other weak spots elsewhere in the rig that need to be replaced I'd appreciate hearing from you. Otherwise I'll ship this order out to Mouser and get on with it.

Date: Thu, 20 Jan 2000 13:06:55 -0500
From: "Warren, W. Thomas" <wtw@rti.org>
Subject: RE: [R-390] AN/URM 25 Capacitor Replacement

I'm in the same boat in that I have my URM25D all in pieces on my bench (being very generous with that term). In addition to the components below that Lankford specifically identifies, others have been mentioned either in Hollow State News or on this newsgroup as worthy of replacement.

Specifically

C132 -- 25 or 35 MF electrolytic depending on model, mentioned by someone who had a physically leaky unit. Here the recommendation of one of our most knowledgeable components gurus is to use a solid tantalum as a replacement. I ordered mine from Mouser last night, but unfortunately don't have the stock number here at work.

C135, C136 -- Someone had C135 go and fry his attenuator. Why not replace them while you have the buffer amp out? I used a 2KV disk ceramic for C135 and paralleled up a couple of silver micas for C136.

While I don't think the jeopardy of C131 popping is too great, it's easy to replace while you're in there.

Take a look at R152, R153, R154, and R155 especially to see that they are in tolerance. A highly recommended procedure to check all resistors to see that they are in tolerance.

May want to measure the ripple on the output of the power supply to see if the filter caps are still good. I measure about 0.15 millivolts ripple across the last filter cap where I use a cheap RS DVM to do the job. Someone else complained about having lots of hum on the XTAL CAL OUT audio (I do also, but not objectionably) and finding that removing C204 helped
that hum. That's a strange one that I don't understand analytically, but respect the report I was given. Caveat!

You might consider replacing ALL the caps on the audio board. After all, it's a pain to take that module apart and caps aren't that expensive. Bit messy undoing all those solder connections, but what the hey.

You also might consider checking out R130 and ALL the resistors in the attenuator. With the attenuator electrically DISCONNECTED from the unit, you should measure the following resistances between the identified nodes:

Between X10K and ground	55.56 ohms
X1K to ground	50.05
X100 to ground	49.99
X10 to ground	49.99
X1 to ground	49.99
X.1 to ground	50.00
between X10K and X1K	94.50
X1K to X100	90.03
X100 to X10	89.99
X10 to X1	89.99
X1 to X.1	89.99

Someone else suggested replacing all coax's with new (including the internal one from the attenuator). I'm using a moderately flexible Times RG58 (more or less equivalent since the diameters are somewhat different) equivalent with double shielding available from The RF Connection near Gaithersburg (look for Roy Morgan's e-mails and you'll see the reference).

Take R119, R127, R173 apart and clean with DeOxit. My R119 was pretty scratchy and I hope to solve that problem with this cure.

That's what I'm doing to my URM25D.

Date: Sun, 23 Jan 2000 18:03:35 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] SG-103 / URM25F Question

>I have a 25F and am curious wheather the same information regarding the
>"D" is appropriate to the "F" model?

I'm a big fan of the 25F. They're a hell of a lot easier to work on than the 25D or it's clones and use cheap as dirt dial lamps rather than the #323's.

>Since the "F" is newer, have some of those problems been resolved in the later design?

Actually the 25F is newer AND older. All of the 25F's that I've seen were built about 1955 or so. I've seen D's that were built in the 1960's. In addition, the later models like the 25G, 25L, etc are clones of the 25D Even though the 25F is different design with a totally different tube lineup it contains about the same number of potential "problem" capacitors as the 25D type. The good news is that you can replace all of them in less than one tenth of the time that it would take to replace them in the 25D. I told you the 25F was easier to work on... :-)

>I'd like to restore what makes sense in my "F" but not disturb
>components that don't need replacement. I do have a manual for the generator and see very few paper caps.

Drop me an email with the contract number and serial number of your 25F and the NavS* publication number and date of your manual. I have a scanned supplement/changes page that may apply to your manual and signal generator and can attach it to you. It's about 200K.

>I have heard about the other types (Micamold, Ceramic lakage problems)
>and am curious about other's experience with the "F" model. Same, Better, Worse, Ect?

There are a series of metal cased rubber sealed axial leaded paper capacitors in the URM-25F that are prone to give problems. Most of the ones I've seen were made by FAST. They're a hell of a lot better cap than those micamold paper caps in the 25D but change them all.

Most people ignore them because they think that they're a glass and metal sealed cap, but they ain't. ;-(In addition, make sure that you replace the .047 blocking capacitor in the CX-2919/U test adapter. It's leaky or will be soon.

>I currently have a problem where my modulation drops out after the
>equipment is on for a while. I do use this for R-390 alignments as
>well as other restoration work. (On topic association!)

I'll bet you a beer that it's a bad capacitor.

A quick run down on the capacitors that I'd change in a 25F even if it was "working" are:

C602 on the power supply. C130, C131, C132, C133, C134, C136, C139,C141, and C142 on the "big board". C121 and C116 on the "small board".

Also, you might want to remove C114, the 120 mf electrolytic can that's clamped next to the 6AG7 and test it. Reforming it at its rated voltage couldn't hurt.

I've also seen a sprinkling of failed micas and a couple of the oil filled paper caps, and even the big oil filled B+ filter cap, but generally, it's the caps listed above that cause the majority of the problems.

Also, if you run into problems calibrating the modulation or signal level aspects of the meter, drop me a note. There are a couple of tricks for doing this providing that your meter is OK.

Date: Sun, 23 Jan 2000 19:45:51 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] SG-103 / URM25F Question

>With my "C", the modulation just dropped out, but if I switched it in and
>out again, it came back -- for a while.

Not a very common model. :-)

>While the higher letter models seem to be more desirable, they do not necessarily indicate improvements in all respects, and capacitor situation seems to cut across them all.

The early URM-25, 25A, 25B (I think the B) models were designed to be used with 53.5 ohm terminations, coax, etc. They used an entirely different bunch of adapter cans. In addition they didn't have the internal calibrator until the 25B model. I'm not sure of the output impedance of the 25C model.

Date: Mon, 24 Jan 2000 15:00:05 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] SG-103 / URM25F Question

>Concur re the value of the URM25F, and agree with you that it is a lot easier to work on.....

Yep, there's no comparison. :-) Some of the caps, like the 0.47's at 600 volts are a little more

expensive but for the difference in the labor, who would really care.

>Mine is SG-103/URM25F NObsr-59613 number 3369:CCBZ

That's the contract. :-) Good old New London Instrument Company.

>I have a repro manual TM11-555IE Sept 1956

Interesting, that's over a year later than the Navy manuals. The supplement may or may not apply to your manual. It'll be easy enough to check by comparing the parts list and schematics. By any chance is the 25E model described in the "Basic Differences" table toward the front of the manual?

>Would appreciate a copy of a supplements/changes to this unit as
>well... if it is not too much trouble.

No trouble at all, I attached it to you several minutes ago. :-)

Date: Tue, 25 Jan 2000 13:21:13 -0500
From: Mark Mohrmann <mohrmannm@mail.lsc.vsc.edu>
Subject: [R-390] Re: AN/URM 25 Capacitor Replacement

Well I'm not the guy to take on that project, but here's a start for someone who will. Here's what I came up with after receiving a couple of responses to the question of which capacitors must go in the URM-25D.

In addition to Dallas Lankford's notes, suggestions included replacing "all paper caps" (what about the hermetically sealed glass to metal tubular ones?), and

specifically: C132 (can be leaky), C135/C136 (known to have fried attenuators). Also, C131 (because its easy to get to), and ALL caps on the audio board (because they're easy to get to).

Audio Subchassis

C159	0.01	300V	per Lankford notes
C162	0.1	400V	all paper
C163	0.1	400V	(replace all with Orange Drops?)
C164	0.01	300V	"
C165	0.01	300V	"
C166	0.2	120V	"
C167	0.2	120V	"

Buffer/Output Subchassis

C130	0.01	300V	paper (replace with 2KV disk ceramic)
C132	25	25V	electrolytic (replace with solid tantulum)
C133	0.022	200V	paper
C135	0.01	300V	mica (replace with 2KV disk ceramic)
C136	510pF	300V	mica
C131	150pF	300V	mica (this one will probably break when you deal with R119 so have a spare available)

Calibrator Oscillator

C155	0.01	300V	paper (replace with 1KV disk ceramic)

VTVM

C139	0.022	200V	paper

More input is needed. Anyone else care to share their 2 cents?

Date: Wed, 26 Jan 2000 01:59:09 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] RF deck restoration

<snip> At a hamfest the other weekend, I found a crank knob similar in style to the original skirted vernier knob (but without the skirt and a bit larger) on the URM-

25D. Makes changing frequencies much, much easier. No more "URM-25D wrist!"

Date: Tue, 1 Feb 2000 08:11:00 -0500
From: "Warren, W. Thomas" <wtw@rti.org>
Subject: RE: [R-390] Mobil 1 Synthetic is a bargain...

Reference your lubricating potentiometers, I've just about buttoned up the URM-25D that's been my winter project (yes, I'm very slow; and unfortunately my hand-eye coordination is about fifth rate! hi).

The microvolts pot in my URM was scratchy and in particular was very nonlinear up near the top end. Obviously carbon had built up near the top stop. So to make a long story short, I disassembled the potentiometer, cleaned it thoroughly with Caig De-Oxit and then put a bit of Stabilant 22 on the sliding mechanism. I'm hoping that all the advice I've read about De-Oxit and Stabilant 22 plus all the marketing hype Caig and the Canadian outfit have put on their web sites are indeed accurate. I must admit that at least the Canadian company has run some pretty convincing tests showing the efficacy of Stabilant 22. Caig gets lots of good press from the boatanchor crowd, but their web site is pure marketing hype.

Also treated the "set microvolts to 10" rheostat (the 4-watt rheostat that sets the voltage on the oscillator plate) with De-Oxit and Stabilant 22. Bottom line on the two pots is that they're much smoother in their electrical operation. Particularly the microvolts pot now acts correctly with no non-linearity at the top end. I went through a couple of q-tips taking out all the loose carbon. Not sure I'm enamored of using Mobil 1 on the wiper of a pot if I infer correctly that you mean on the actual resistive material thus lubricating the wiper/resistive-material interface. Sounds risky in that ordinary oil (to my knowledge) isn't known to be a conducting substance. Possible, but not ordinarily known so. We need a organic chemist to chime in at this point.

Stabilant, on the other hand, goes through some discussion about being a "block polymer" (I'm an EE, not an organic chemist), thus electrically conductive through a thin boundary layer, and independently a low-vapor-pressure (implying that it won't disappear over time) lubricant. Stabilant isn't cheap, but it's made by a low-volume boutique operation in Canada, thus doesn't catch the economics of large-scale production. On the other hand, maybe about the time I head for the barn 30 or so years hence, I'll know the long-term lubrication and conduction capabilities of Stabilant. THUS IN THE LONG RUN, THE PRODUCT MAY BE VERY CHEAP.

Date: Fri, 04 Feb 2000 08:37:08 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] URM-25D pots...

>Reference your lubricating potentiometers, ...

Glad you got it finished. :-) I know that changing those capacitors is a royal pain, but over the long haul, it'll be well worth it. I'm guessing that you didn't have any problems with the alignment then, that's good.

>The microvolts pot .....was very nonlinear up near the top end.....

Bad pots are a pretty common problem in the URM-25x's. I had an interesting problem calibrating one caused by the adjustment pot for that circuit having increased in overall value from 2.5K to about 5.5K. The only decent quality spare 2.5K pot that I had was and A-B type J. The killer was that it had a conventional shaft without the locking provisions. I ended up cutting up another type J that had what I needed and assembled one pot from two. I hated to waste the other type J but really didn't have much choice. I've been keeping my eyes open for a spare 2.5K type J pot with the shaft lock, but as of yet, it appears that they're non existent. ;-(

>.....with Caig De-Oxit and then put a bit of Stabilant 22 .....

As much trouble as it is to remove that pot, if I do, I'm going to put a new one in it's place. The one in the F model is a snap to get to though. I wouldn't hesitate to experiment with it.

>Also treated the "set microvolts to 10" rheostat .....

That ones another one that's commonly bad. The ones that are currently in both my D and F models are good and I lucked into a NOS spare last year. They're hard as hell to find and when you do, pretty evil to change.

>Bottom line on the two pots.....

I'm glad it worked out for you OK. The way that my luck runs, I'd have done what you did and have had to end up pulling them out again and replacing them. <grin>

>Stabilant isn't cheap, ...

Their prices are a lot higher than I'm willing to pay especially after the way they treated me on the phone called them for an MSD sheet a couple of years back. ;-(
nolan

Date: Sat, 05 Feb 2000 19:16:45 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] URM-25D pots...

Actually: http://www.hhsmith.com/shaftaccess.html for a picture,

http://www.netcomponents.com/cgibin/hhsmith.asp?partnumber1=181&partnumber2=&partnumber3=&pq=Search for distributors with stock
and: http://www.keyelco.com/kec/standpro/sprod15.htm
and: http://concord-elex.com/cgi-bin/part0.cgi?pg=SL::0&pi=319

These pages show pictures and part numbers but I refrained from overloading the qth.net server and those without browsers from sending them to any but Nolan last night.

Date: Mon, 07 Feb 2000 13:34:27 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] URM-25D Refurbishment

The simple wide band oscillator in the 25D should have a great deal more phase noise than the R-390. There was an article or letter to the editor in a Proceedings of the IRE long about 1963+/- a couple years (Proceedings of the IEEE after '63) that suggested an odd multiple of a quarter wave of coax and a double balance mixer could be used to extract phase noise from an oscillator. The coax makes a phase shifter, the longer the better, and when the frequency or line length is adjust to make the phase shift exactly 90 or - -90 degrees, the double balanced modulator acts as a phase detector, then the phase noise can be read out with an audio spectrum analyzer. Far simpler than using a pair of oscillators to cancel out the carrier (and probably double the phase noise). Far cheaper than finding a spectrum analyzer with noise lower than the oscillator. I've not yet tried the coax scheme and I don't remember the calibration but it can be calibrated.

Date: Thu, 17 Feb 2000 13:01:07 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM 25-D Question

No, the D model might be a pain to work on, but there's a zillion of them and the later "D-clones" out there. The spare parts availability, documentation, and knowledge base is far better than that of the F model. Keep it and re-cap it. It's easier to go thru the extra work with your D model than have to find a buyer for it and ship it, find a seller of a URM-25F in as nice a condition as your D model, sweat the shipping, find a manual, etc.

Date: Thu, 16 Mar 2000 17:10:24 -0600
From: "Tom Lutz" <telutz@pclink.com>
Subject: Re: [R-390] frequency counter

You are correct, mine is the Radio Shack 22-306. You are also correct in that the sample size is somewhat small. But for what I use it for it works great. Usually I leave it hooked up to my URM-25 as a read out and I find it very stable and accurate against other standards.

Date: Tue, 16 May 2000 20:15:33 -0400
From: "Mort Denison" <mdenison@blazenet.net>
Subject: [R-390] RE: URM25D Woes

I want to thank everyone who kindly offered to fix my signal generator. At the suggestion of a list member, I called up Fair Radio and talked to RJ, their resident URM25D guru, to see what was available and what he had to suggest. Although they had no URM25D's or URM25F's at the moment, he told me I was in luck. It seems that when they were plentiful, they would part them out for the cases and power supplies. He had rat-holed the good, nice looking innards with panel and offered me one for $25 and said if it didn't work he'd make it right. If any of the list members are interested, he talked like there were more. So - if anyone wants my TV7A sans meter but with the Army tech manual, I'd like $70 plus shipping. I haven't pursued the meter - I hear they're rare - because I've been using a Triplett 3444A.

Date: Thu, 8 Jun 2000 05:15:34 -0400 (EDT)
From: Norman Ryan <nryan@duke.edu>
Subject: [R-390] URM-25D Tweaks (long winded version)

A URM-25D followed me home from Dayton along with other gear. It was dirty, had a zip cord soldered onto the power input connector, and was missing its cover and accessories. I spotted it during the waning hours of Hamvention 2000 and got it for a song, figuring it would be a handy parts source. Just got around to cleaning it up and eyeballing the insides before performing a smoke test. Was surprised how much cleaner the interior was than my working and complete unit. Couldn't find anything wrong inside and it passed the smoke test. I was also struck by how smoothly the frequency adjust knob turned. My bench unit's frequency adjust knob always was on the sticky side and because of it, I hated going through all those frequency changes during a full press R-390* alignment. Putting a drop or two of my favorite lubricant, Mobil-1 gear oil, on the URM-25D's bronze bushing under the tuning knob helped some and fitting a larger knob with a crank handle helped even more. I let it go at that, having no frame of reference for how smoothly one of these signal generators should tune. The "parts rig" got

me to investigating the working unit. I found the cover over the frequency adjust section had no rubber gasket, the Dayton one did. I removed the two knobs on the bench unit and loosened the cover. Immediately the tuning shaft freed up. After a lot of fiddling, I found the cover needed to have the four holes on the cover enlarged a bit to enable the screws to go through the cover and into the studs underneath without causing the tuning shaft to bind. While in there, I took off the black masking disk, clear plastic piece with the line scribed, and the frequency dial under it. Cleaned everything, put a drop of oil on the bronze bushings, and put everything back together, being careful to preload the two piece split dial gear. Shaft resumed binding. Drat! Took the cover off again and after a while determined that the cover needs that missing gasket to elevate the cover a millimeter or so. Even one of the dial lamps (those teensty #323's) was pressing on the clear plastic bit and contributed to binding. It's a wonder I didn't break the little bulb! In the end I added spacer washers to the four studs under the cover to elevate it and made a promise to locate some replacement gasketing. It's the U shaped profile stuff that I'm at a loss to know where to find. Bottom line is the cover is a fussy item. If anyone has trouble with stiffness in the frequency adjust knob, this post might help you. If all else fails, however, there's always mayonnaise packets. :-) The crank knob I had added to the unit makes frequency changes fly. I'm looking forward to lots faster alignments. The knob is also a bit larger than the original, although in the same shape and style. For fun I carefully removed the vernier skirt from under the original knob and drilled and tapped it onto the underside of the crank knob. Looks factory cool. Oh yes, the "parts unit" works electrically perfectly-- frequencies are spot on. Are BA's fun or what?

Date: Wed, 13 Dec 2000 20:00:00 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: [R-390] URM-25 Stability?

So my new freq counter says my URM-25D drops 2 kHz in 20 minutes after a 2 hour warm up period. How bad is that? If it was worse than that what would be the best place to start fixing it? If its best to warm up an old tube for several hours before using it, I should also warm it up for a long time before testing it, right?

Date: Wed, 13 Dec 2000 23:44:25 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25 Stability?

>S...URM-25D drops 2 kHz in 20 minutes after a 2 hour warm up period.....

How long did you let the counter warm up, Joe? <grin> I never checked the variance during warm up. Is the drift consistent at 2 KC on each of the bands?

>How bad is that? If it was worse than that what would be the best place to start fixing it?

You probably won't unless you start replacing components with better temp characteristics. It's more trouble than it's worth. It could turn out being one or more of the tubes or even the variable capacitor. ;-(If you really want to narrow the cause down, you might want to compare the drift between both the calibration standard and the RF output and each of the bands and look for "common" components, sections.

>.....several hours before using it, I should also warm it up for a long time before .....

I've used tubes 60+ years old and never bothered with any kind of break in procedure other than for mercury vapor rectifiers. I do remember reading that some transmitter tubes should be "cooked" for a period of time before being placed in use. I don't remember where I read this. It might have been the RCA TT-3 or TT-4 manuals. But while on the topic of "warm up", I've been screwing around with the various models of the URM-25* for a long time. If I'm going to align a receiver with one, I always turn the signal generator on the night before with all of the pots fully CCW. Ditto for using the HP-606A. I was looking at the specs on this monster Eaton/Ailtech 380K11 that I'm playing with and the warm up period for the 10 MHz master oscillator in it is 72 hours. Make sure you check the tubes for gas anytime you pull the 25 -D down. For a good gas check, let the tube cook five or ten minutes before testing. I can tell you that one thing that will drive you nuts as far as drift goes is a varying line voltage. Let yours warm up good on a variac, stick a counter on the output and vary the line voltage a volt or two in either direction. It's not the B+ either that causes problem. <grin> One of the things that was changed when the 25-G came out is a regulated filament voltage supply for the osc. tube. The way they did it was "crude" in that they added a 12 volt filament winding, dropping resistors, and two zener diodes. I guess that they got their idea from the Lucas charging system used by Triumph and BSA. ;-(It generates a bit of heat. I can feel the difference in case temperature between the URM-25D and my URM-25G. There were a few Govt and "civilian" mods to the power supply in the URM-25* using SS devices to regulate the filament voltage for the osc.

<snip>
Did you run into any problems calibrating the RF voltmeter portion of your 25-D? If so, give me a holler I can tell you how to fix it.

Date: Thu, 14 Dec 2000 01:10:56 -0500
From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] URM-25 Stability?

This doesn't sound right . You probably have some component(s) that are drifting with prolonged heat. I would suspect capacitors. Tubes should be stable within 10 minutes or so, both to operate and to test.

Date: Thu, 14 Dec 2000 08:03:35 -0500

From: "Jim Brannigan" <jbrannig@optonline.net>
Subject: Re: [R-390] URM-25 Stability?

To state it a different way....the drift is 100hz. per minute or almost 2hz. a second. That would be annoying while trying to align a selective circuit. My 25D is stable enough at low frequencies to align an IF without retuning the 25D. At progressively higher frequencies it is less stable, but the circuits are broader so it is not a problem. At 6M or tripling to 2M the 25D is all over the place, but still usable. Nolan, I've checked the voltmeter on the 25D against a (hopefully) calibrated scope and it was in the ballpark. Any other information would be appreciated. Actually any tips for calibrating test equipment would be helpful. Those of us without access to laboratory standards are always wondering if our test equipment is giving us good information

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Date: Thu, 14 Dec 2000 09:31:37 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] URM-25 Stability?

WELL,,,,, if it drops 2 kc when running at 30 megacycles, that is wonderful.
If it drops 2 KC when running at 50kc, that is terrible.

Date: Thu, 14 Dec 2000 08:13:46 -0600
From: "J. G. Kincade" <w5kp@swbell.net>
Subject: [R-390] Do-it-yourself TE Calibration

Keep an eye out for small calibrators at surplus dealers. Being "oddball" equipment, they tend to go cheap, in spite of their very high price new. I got lucky and bought a small TEK "Calibration Fixture" (surplused by the local FAA cal facility) very cheaply because the junque dealer wasn't sure what it was or if it worked, and didn't think he could sell it very easily. He got it in a pallet load of more common and popular stuff. Don't recall the Tek model number offhand, but it puts out + or - DC voltage plus a perfect-looking p-p calibrated square wave from tenths of millivolts up to 200V in 20 steps, and also has a single-value (5 milliamps, I think) current calibration output. DC output appears to be extremely accurate when matched against a couple of new, calibrated Fluke and Wavetek DVM's (probably more accurate than either meter, actually), although the unit was last calibrated by the FAA lab over 4 years ago. The square wave appears to be spot on also, when compared to two different Tek scopes, neither of which have been calibrated since George Washington was president. Doesn't take up much shelf, and has turned out to be extremely useful around the bench.

Date: Thu, 14 Dec 2000 08:45:00 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] URM-25 Stability?

I recently did a partial rebuild of the HF module in my signal generator (AN/TRM1). I replaced suspect caps and out-of-tolerance resistors. When I put it back together, I found that if I simply breathed on the oscillator section, it would change frequency by as much 1000cps or more. Certainly something is temerature sensitive, but I'm not sure what it is. I used ODs and dipped silver micas caps. The only two fixed caps I did not replace was a coupling cap and a bypass that was made like a little stand-off insulator (common style in those days I suppose).

Is this sort of temperature sensitivity normal in a simple circuit? I can breathe on the R390A all I want and it isn't affected :) Once the thing is sealed up and in the case, I won't be able to breathe on it, so this problem won't exist, but I was left rather curious about what could cause this kind of sensitivity. This generator uses a large variable cap to change frequencies. Would the capacitance of this component be that sensitive to temperature changes? I wouldn't think so. The grid tanks are comprised of a slug-tuned coil and a ceramic trimmer for each band. Would these be suspect? The temperature sensitivity isn't isolated to one band, so it seems to point to a common component. Any thoughts? Wish I had a schematic to share...

Date: Thu, 14 Dec 2000 08:50:44 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25 Stability?

>To state it a different way....the drift is 100hz. per minute .....

I think that his drift problem is only during the warm up period.
If not, Joe's got problems! ;-(

>My 25D is stable enough at low frequencies.....

Mine too.

> At progressively higher frequencies it is less stable.....

I've never tried using one about 50 some ought MHz, that's interesting. :-) One thing I've noticed is that they are very susceptible to instability caused by external mechanical forces and it's gets a lot worse worse as the frequency increases. The 25F seems to be worse than the 24D or G in this regard. If you bump one, the output frequency will change. Ditto for bumping the bench or moving anything heavy around on it. When I've getting ready to use the 25*, I take it off of the bench and sit it on wooden seat bar stool next to the bench.

>Nolan, I've checked the voltmeter on the 25D .....

Next time you you have your URM-25D apart, check the resistors in the modulation meter circuit. If R167, R168, R170, or R171 have drifted upwards

more than 5% from their marked values replace them. Also, check R169, the meter calibration pot for the modulation meter function. It's a 2500 ohm carbon pot. If it measures much more than 2500 ohms between terminals 1 and 3, replace it too.
There are some other potential problems that can cause some hair pulling when you attempt to calibrate the RF voltmeter function. Check R129, the 100 ohm resistor that one end of is soldered to the back end of the 200K front panel BNC connector. It's probably out of spec from being soldered and unsoldered a few times. Since the 200X jack is used to set the output levels during the calibration procedure, you want R129 to be as close to 100 ohms as possible. If you have one that is slightly lower in value, like 99 ohms, use that one as a replacement. By the time it's soldered into place, it'll probably be 100 ohms. ;-) Also, check the value of R130, the 500 ohm resistor that feeds the input of the attenuator. It's a film type resistor located on the buffer amplifier subassembly. It should be 495 to 505 ohms max. It's another negative temp coefficient resistor so if it out of spec, you'll have to do some searching to find one. If you run into problems not being able to adjust R172 high enough to get a full 2 volts out of the 200K jack when you're making the calibration adjustment, then R144 a 4.7K resistor has probably drifted up in value. Replace it with one on the low side of it's 4.7K value. It'll give you more adjustment. If that doesn't do it, check the 10K R128 between pins 5 and 7 of the 5726 tube to see if it has increased in value. If so, change it. This should take care of any problems you have providing that the meter is in spec. If not, holler back.

Date: Thu, 14 Dec 2000 09:19:37 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25 Stability?

It was done in jest, I was messing with him and poking fun since he lives up where it snows and I don't. :-)

>If your counter has a ovenized crystal and you
>start it from dead cold, and I mean cold, it could show
>drift of maybe 200 Hz within the first 2 minutes.

That could vary a lot depending on the on the frequency of the master oscillator in the counter and the frequency being measured at the time. A 10 MHz master oscillator and measuring a frequency of say 15 KHz would show about 100 times less drift than a counter with a 1 MHz master oscillator being used to measure a frequency of 50 MHz.

>Unless you dropped your new $0.95 Ramsey counter out of
>the tenth floor unto the freshly fallen snow of another
>Chicago blizzard, it ought to be very much more stable
>than +/- 50 Hz!

<ROTFL> I love it!

Date: Thu, 14 Dec 2000 11:01:54 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] URM-25 Stability?

... One thing I've noticed is that they are very
>susceptible to instability caused by external mechanical forces

CHECK THE SHAFT END PLAY.

I had a URM-25D that would jump frequency if I pushed/pulled on the frequency knob. It turned out to be end play caused by the rear shaft ball bearing load screw being loose.

1) Get into the RF compartment and locate the rear end of the frequecy set shaft. You will find a ball bearing whose clearance is set by an adjustable setscrew. The thing has a locking nut.

2) IMPORTANT: Loosen the nut and screw a bit, and CLEAN it with alcohol, naptha, acetone or some such. Do not use finger nail polish (it has oil in it for milady's skin.) Flux remover would be ideal.

3) after a thorough warm-up period, set the end play so it just disappears: no end play and no binding.

4) Hold the screw and tighten the lock nut.

5) IMPORTANT: Seal the lock nut with a bit of finger nail polish, Duco Cement or similar.

6) Lubricate the worm and drive gears (grease), the ball bearing, and the front bearing of the shaft (oil). Treat the variable capacitor rotor grounding finger with just a drop of Caig De-Oxit or Pro-Gold.

7) Close the whole thing up and enjoy your back-lash free generator.

Date: Thu, 14 Dec 2000 11:00:23 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

Its not an 8640! Be glad its stable enough you can keep it in the receiver IF for minutes at a time without having to align with one hand on the signal generator knob. Did the frequency drift mostly linear with time, or did it jump?

Either could come from a capacitor in the oscillator or buffer circuit. Capacitors in the URM 25 weren't any higher quality than the black beauties in the R390 and need the same attention to replacement.

Mica capacitors or dipped silver micas sometimes contribute to instability by having air spaces inside, but that's not often. Freezemist and heat might isolate the most critical components to frequency stability. Do you have the Dallas Lankford notes on the URM-25D?

Date: Thu, 14 Dec 2000 11:00:41 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

The tubes that respond to heating are all those bigger than a 6AG7 with large glass to metal seals. I know an 829 responded to such heating years ago. There will always be gas leaks at the seals and running heater/filament power alone can raise the getter deposit temperature and make it more effective at grabbing the stray gas molecules. And might even cause a bit off circulation inside the tube to improve the odds of those strays running into the getter deposit and would heat the rest of the tube elements to cause them to release molecules better. I suppose that ALL tubes with glass seals might respond some to a few hours of heater alone to improve the gas situation especially those stored more than a few years.

Date: Thu, 14 Dec 2000 11:00:41 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

The tubes that respond to heating are all those bigger than a 6AG7 with large glass to metal seals. I know an 829 responded to such heating years ago. There will always be gas leaks at the seals and running heater/filament power alone can raise the getter deposit temperature and make it more effective at grabbing the stray gas molecules. And might even cause a bit off circulation inside the tube to improve the odds of those strays running into the getter deposit and would heat the rest of the tube elements to cause them to release molecules better. I suppose that ALL tubes with glass seals might respond some to a few hours of heater alone to improve the gas situation especially those stored more than a few years.

Date: Thu, 14 Dec 2000 11:27:35 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>

Subject: RE: [R-390] URM-25 Stability?

Yes, it's an air-variable. I hadn't thought about humidity. It is certainly a fast-acting phenomenon -- perhaps too fast to be temperature. Humidity is a good thought. Perhaps I should get out the hair dryer instead. If it's more just humidity than temperature, then closing it back up will be a 98% fix. It's not hermetically sealed, but it's not directly in any airflow either.

Date: Thu, 14 Dec 2000 17:11:39 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: RE: [R-390] URM-25 Stability?

Well, I don't know what yours is built like, but I think that is a big concern because the URM-25 variable cap is inside the big cast aluminum chamber inside the generator's case. That inside chamber has seperate smaller chambers to isolate other parts of the circuit, too. So I'm thinking that this unit has to be allowed to warm up for at least 2 hours before everything gets stable. Its quite the piece of work, every bit as interesting as the R-390A! You should see the huge turret switch on the URM-25's.

Date: Thu, 14 Dec 2000 17:19:00 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] URM-25 Stability?

Actually, Roy, I should have included that as my observation doesn't mean much without that information. It seems to drop by a percentage of the reading, that is the last two numbers of the display are the only ones that change no matter what the band, it did it that at 455 kHz and at 3 Hz.

Date: Fri, 15 Dec 2000 08:18:56 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25 Stability?

>CHECK THE SHAFT END PLAY. <snip>

I checked my 25G and it exhibits this type symptom to a very slight degree. Next time I open it up, I'll fix it. :-) The 25F uses a totally different setup with a springy double belleville spring type shaft coupling. I had always figured that it was used for shaft misalignment problems. After reading your post I now suspect that it was to decrease changing the position of the variable capacitor due to in and out pressure on the tuning shaft. Next time I open up the 25F, I'll look into that, thanks.

Date: Fri, 15 Dec 2000 08:22:12 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25 Stability?

>There will always be gas leaks at the seals and running
>heater/filament power alone can raise the getter deposit temperature and
>make it more effective at grabbing the stray gas molecules.

That's the gist of what I had read, thanks Doc. Do you remember what the source was?

Date: Fri, 15 Dec 2000 08:30:24 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: RE: [R-390] URM-25 Stability?

.....big cast aluminum chamber inside the generator's case.....

There's a lot more mass to raise the temperature of in the 25D/G/H design than the 25F design.

>That inside chamber has separate smaller chambers to isolate other parts of
>the circuit, too.

And makes it a lot harder to work on. ;-)

> So I'm thinking that this unit has to be allowed to warm up for at least 2 hours before everything gets stable.

Did you let the beast run overnight and put the counter on it yet?

Date: Fri, 15 Dec 2000 10:46:20 -0500 (EST)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: RE: [R-390] URM-25 Stability?

For my amusement, and to test perceived stability of my URM-25D and HP 5328A counter, I ran the pair for nearly a week, monitoring the drift. I wish I'd been more careful recording the values, but when set to the 1MC area, it was drifting +/- 2KC over a 24 hour period. Now that I know it is also sensitive to power line voltage, I should monitor that, too. Better yet, I can run some experiments with a semi-fancy power conditioner I've got and a Variac to see how far it allows voltage to drift, then

use that in to power the URM-25D. I've enjoyed reading the URM-25 and other test equipment threads - lots of good information there! For the time being, I'm happy with the BA test gear, but am aware I could do better.

Date: Fri, 15 Dec 2000 11:11:59 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

The weight of the chambers is more a convenience for building from a casting than planning on the mass for thermal control. The shielding is absolutely necessary for hiding the oscillator running a watt or two of power from a receiver wanting to see something less than -120 dbm. It takes a lot of attention to details to keep the leakage down that low. Its even harder to get the leakage down below -145 dbm. Even starting with a 1 milliwatt oscillator.

Date: Fri, 15 Dec 2000 14:22:02 -0800
From: Ed Zeranski <ezeran@concentric.net>
Subject: RE: [R-390] URM-25 Stability?

My backup sig gen is a 25F. There were some switch problems and a loss of mod but it has been fine since the fix. I do let it cook over night before using it though.

Date: Fri, 15 Dec 2000 17:30:10 EST
From: Llgpt@aol.com
Subject: Re: [R-390] URM-25 Stability?

That's a very sensible idea, I have always left the R-390A, SP-600's etc. warm up overnight before alignment.

Date: Fri, 15 Dec 2000 16:07:48 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] URM-25 Stability?

I didn't mean that the mass was for thermal control, what I was considering is that since its there it has to reach thermal equilibrium in order for the generator to be stable. That should take a lot longer than on a cheaper commercial unit. Do you have any suggestions to reduce the leakage on an old URM-25*? Any suggestions for optimizing stability?

Date: Fri, 15 Dec 2000 19:33:55 EST
From: Llgpt@aol.com
Subject: Re: [R-390] URM-25 Stability?

Place it on a very sturdy table/bench.

Date: Fri, 15 Dec 2000 19:47:43 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25 Stability?

>Do you have any suggestions to reduce the leakage on an old URM-25*?

If I was going to aim for the least possible RF leakage from a 25D/G/H the first thing I'd do is replace the internal coax lead from the casting to the attenuator with a the best shielded coax I could find. Maybe even some type of semi-rigid copper tubing outer covering like is used in microwave applications. The next step would be to put a BNC caps on all of the unused BNC jacks on the front panel. Next, I've verify that the internal cover on the attenuator is fully seated along it's circumference. I'd look at possibly adding finger stock or copper screening along the perimeter of the front panel where it slips into the main cabinet. The step would probably be a pain in the ass, but I'd verify that the cover of the cast housing screws up dead flat against the main housing. You can verify that the inner walls mate with the cover with plastigauge. If it isn't, then a machinists straightedge would let you know if the cover was at fault or the main casting. If it was the cover, a little time spent on a lapping block would fix it. If the main casting was the problem, you have to remove whatever components that would prevent it from lying flat on the lapping block. You should be able to lap it flat without removing it's innards. Just make it a point to clean the surfaces before you flipped it over. I read somewhere that copper screen strips placed across a surface to be "sealed" is better at containing RF than a perfectly mated dead flat surface. I don't know if it's true or not, but Doc should know. If it does indeed work that well, if might be worth just laying a piece of copper screen over the casting before installing the cover. Doc? Maybe some ferrite beads on all of the wiring that feeds into the casting at the bypass caps, meter leads, etc.

>Any suggestions for optimizing stability?

Replace all of the know problem caps. Verify that all of the tubes are good, and gas free. Use a 6AG7Y. The Y is for a low loss base. I'm sure that the Govt specified that tube for a reason. The totally different F model uses it in addition to the D and it's clones. Either do one of the regulated voltage doubler mods for the osc. tube filament or run the entire thing off of a constant voltage supply. Replace the voltage regulator tube with one of the industrial numbered ones with tighter regulation. Dismantle the attenuator and clean it's innards and lube it's bearing points with synthetic oil. Don't sit it on the bench you're working on. Oh, and most importantly, do not consume anything with garlic in it for at least 72 hours before using it. <grin>

Date: Fri, 15 Dec 2000 22:00:46 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] URM-25 Stability?

Hi Nolan: You wrote: <snipped>.. I read somewhere that copper screen strips ..... I have some equipment with seals or whatever you call 'em like that. Just picked up an R-2142/UGM-112 which is a glide slope/localizer test receiver I think. (This, of course, will help me in my work.) About the size of a URM-25, but much lighter -- similar case design in a way. It has a groove in the backside of the front panel that goes all around with a metal mesh welting that crushes against the flange on the case when you screw it down. A little like the grooves with rubber seals on the R-1051 panels, but wire mesh. I have some mil computers with the same thing. It's a silvery metal,not copper as far as I can tell, maybe plated, and it's a bit springy. I'm sure it must still be used on mil. and certain industrial equipment, so it should be possible to buy it by the foot. Looks like a cross section would be about 1/8" X 1/4" rectangular, or oval, thereabouts.

Date: Fri, 15 Dec 2000 22:05:05 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

Yes, the castings warm slowly, which may slow thermally induced frequency changes. And are fairy rigid minimizing thermally induced motion which can be hard on frequency stability.

Leakage is hard to improve. Takes things like changing feed through capacitors to feed through filters, adding layers of shielding, improving power line filters, capping the high level output jacks when not in use. It might make a difference whether the cap is a plain cap or a shielded termination. The results may depend on the construction of the shielded termination. BNC connectors are not consistently grounded. N or TNC do better for leakage. There has to be attention to stray conductive paths between concentric shields which ideally will only be connected at the RF connection. My best shielded test generators have double shields with the generator running on a battery with the switch on the inner box run through a piece of teflon or nylon. The only metallic connection between the two shields is at the coax connector.

All shields can be generally improved by using conductive gaskets, and sometimes by covering the joints with Scotch aluminum or copper shielding tape. The tape is fairly expensive though I've found it surplus occasionally and not a sure cure because the adhesive isn't a really good conductor. Soldering the joints and seams often helps when they can be soldered and never need to be opened. Fasteners on bolted joints should be fairly closely spaced. If a box leaks, doubling the number of fasteners may have a detectable effect unless they are already under an inch apart. Controls, tuning shafts and band switch shafts should be of insulating material, never metal because metal through a hole bypasses the best shielding even with wiper fingers. Round holes leak less than slots.

Improving stability is harder. The band switch or turret contacts are a big problem. That's one of the fundamental ways the R-390(a) is so much better than a Hammarlund or Hallicrafters of similar vintage. The variable frequency oscillator has no band switch contacts. The only contacts are at the crystals and in far less critical gain stage tuned circuits. Crystals band switch with lots of variation in contact resistance without a significant change in frequency.

One of the fundamentals of stable oscillator design is to minimize tuning range and keep most of the tuned circuit capacitance in stable fixed capacitors. But that's in conflict with a wide tuning range on each band. So most of the tuned circuit capacitance is in the variable capacitor, which makes stability very much dependent on the quality of the capacitor and its rotor contacts. Good oscillator circuits use large valued feed back capacitors (Colpitts circuit) to swamp tube capacitance changes with a small coupling capacitor to the tuned circuit. Often signal generators because of their wide frequency range, use a tapped coil Hartley circuit. That makes it harder to isolate the tube from the tuned circuit. If the grid C is isolated with a small coupling capacitor, the cathode tap has to be moved and is always a compromise to keep the oscillator level reasonably flat across each band. Sometimes the compromise is just to keep the oscillator running all across each band.

All fixed capacitors in the tuned circuit should be dipped silver mica (that are individually proven to be temperature stable) though there may be some temperature compensating ceramics to help temperature stability. Variable capacitors can be more stable with hairspring rotor grounds than wiper rotor grounds or by using a circuit where the rotor ground can be eliminated (balanced tuned circuit like the SCR-522 VHF receiver). Mechanical stability is critical.

Temperature stability can often be improved by adding insulation on the outside of the oscillator chamber, then added a thermostatically controlled heater, as simple as a positive temperature coefficient thermistor set to have a transition a bit above the normal internal operating temperature. Better heater controls may produce a bit better oscillator frequency stability, but the band switch mentioned earlier may negate them all.

A band switch can be made less of a problem by using a tuning capacitor section per band and an oscillator active device (transistor or tube) per band so the band switch only handles the output from a low impedance point (tube cathode) and DC. But this turns into a radical redesign. Some oscillators tune only the highest band and are divided by analog or digital frequency dividers to reach the lower frequencies.

If stability is more important that radiated noise, the same counter type frequency stabilizers that work for transmitter VFOs work on signal generators, but getting the RF signal level up to logic levels means shielding of the counter is tougher than shielding the oscillator. For sure, running most counters to monitor

frequency keeps the oscillator shielding from being of benefit to find the receiver mds. So this technique of stabilization is at odds with leakage.

Generator leakage is found more by poorly shielded receivers. Its important to use double shielded or rigid coax connecting cables to cut the stray leakage into the coax. Good Belden RG-58 may be only 50 dB down from a wire antenna. RS coax that skimps on braid may be a lot worse.

It takes a lot of attention to details to accomplish MDS measurements that repeat.
73, Jerry K0CQ

Date: Fri, 15 Dec 2000 22:17:59 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

> If I was going to aim for the least possible RF leakage from a
> 25D/G/H the first thing I'd do is replace the internal coax lead
> from the casting to the attenuator with a the best shielded
> coax I could find. Maybe even some type of semi-rigid copper
> tubing outer covering like is used in microwave applications.

Good idea.

> The next step would be to put a bnc caps on all of the unused bnc jacks on the front panel.

Should have been done first thing.
>
> Next, I've verify that the internal cover on the attenuator is
> fully seated along it's circumference. I'd look at possibly adding finger stock or
>copper screening along the perimeter of the front panel where it slips into the
>main cabinet.
>
> The step would probably be a pain in the ass, but I'd verify that
> the cover of the cast housing screws up dead flat against the main
> housing. You can verify that the inner walls mate with the cover
> with plastigauge. If it isn't, then a machinists straightedge would
> let you know if the cover was at fault or the main casting. If
> it was the cover, a little time spent on a lapping block would
> fix it. If the main casting was the problem, you have to remove
> whatever components that would prevent it from lying flat on the
> lapping block. You should be able to lap it flat without removing
> it's innards. Just make it a point to clean the surfaces before
> you flipped it over.
>
> I read somewhere that copper screen strips placed across a

> surface to be "sealed" is better at containing RF than a perfectly
> mated dead flat surface. I don't know if it's true or not, but
> Doc should know. If it does indeed work that well, if might be
> worth just laying a piece of copper screen over the casting
> before installing the cover. Doc?

I'd class that as a conductive gasket. I'd just almost prefer a knife edge than the gap imposed by the screen wire. I'd feel better by using more screws along the edge with more L brackets than just using an oil can style cover where the edge contacts was by pressure and fit. Then the conductive Scotch may help.

> Maybe some ferrite beads on all of the wiring that feeds into
> the casting at the bypass caps, meter leads, etc.

Ferrite beads here are just palliative that's mostly ineffective. A few ohms (maybe 50) series reactance where thousands are needed. The feed through capacitors with only a few thousand PF need to be replaced by 0.1 feedthrough papers with zero shunt inductance or metal packaged feed through L or Pi type filters. I don't know if they can still be bought, but the inductance needs to be inside its own shield to be worth the bother. One might add an RF choke and second feed through filter capacitor on a closed box mounted over the existing feedthroughs.

Date: Sat, 16 Dec 2000 11:30:56 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] URM-25 Stability?

>I'd class that as a conductive gasket.

Yes, that'd be a good description. I never did know what the stuff was called.

>I'd just almost prefer a knife edge than the gap imposed by the screen wire.

It seemed to me that the dead flat and mated surfaces would be better two. Maybe the conductive gasket is cheaper than quality machine work.

> > Maybe some ferrite beads on all of the wiring that feeds into
> > the casting at the bypass caps, meter leads, etc.
>Ferrite beads here are just palliative that's mostly ineffective. A few
>ohms (maybe 50) series reactance where thousands are needed.

OK, no ferrite beads then. They do look cool though. ;-)

>A low loss adapter to use a 5763 in place of the 6AG7 might be of benefit.

The oscillator in my Q-meter uses a 5763.

Date: Sat, 16 Dec 2000 12:59:55 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

You need contact, close doesn't count. A slot radiates according to its length, not its width or depth. braid around an o-ring in a slot seems to be more predictable. My Q-meter uses a 5763. I had to figure it out when I bought it from the circuit connections because it was missing. I got the manual later.

Date: Sun, 17 Dec 2000 13:17:17 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] URM-25 Stability? Cured! Update.

Warmed up for 12 hours, case has no cool spots, evenly warm, output reading solid as a rock. After 24 hours, same thing. Conclusion: Needs l-o-n-g warm up time to get EVERYTHING warm and stable.

Date: Tue, 19 Dec 2000 21:19:27 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] URM-25 Stability?

Ferrite beads function as RF 50 ohm resistors from HF through microwave, not a lot of series impedance, but relatively independent of frequency. RF chokes, below their series resonant frequency, can often produce a much greater impedance and so in that frequency range, a greater filtering effect, providing the chokes are well shielded and the bypass capacitors have low inductance (such as feed throughs). The wire with ferrite bead has lower DC resistance than the RF choke. Castings like any other metal work need to be annealed to keep them from warping. Some ferrites are good insulators, some are conductive. The only way to be sure is with an ohmmeter.

Date: Wed, 20 Dec 2000 08:06:50 EST
From: Llgpt@aol.com
Subject: [R-390] URM-25D Stability

Monday evening when I got home from work, I turned my URM-25D on in prepartion for an IF alignment on a John R. Leary SP-600. Did it yesterday evening, in approximately 26-1/2 hourss, it had drifted 1200 cycles (hertz for the younger guys) Not bad for a vintage piece of test equipment.....

Date: Sun, 21 Jan 2001 22:10:58 -0500
From: Al Solway <beral@videotron.ca>
Subject: Re: [R-390] IF Gain Adj. Pot R519

Walter I built the 50 to 120 Ohm matching pad you describe on your R-390A Restoration site. Much appreciated. My URM-25F O/P was calibrated using the procedure describe in the manual. It was about 2.3V, at 100Khz, prior to adjustment. Used a HP410C as the V standard. Adjusted to 2.0V at J101. The open circuit O/P at the RF Output, 100,000uV attenuator position, is 0.18V which is close to what it should be. I also checked the attenuator DC resistance. It was 61 Ohms at the 100,000uV position and 51.1 Ohms on the rest. Also checked actual attenuation of each position except 30uv and below. Each position was within +/- 0.3 Db. I don't remember the the total error. Used a frequency selective VM for this. The matching pad measured 19.8 Dbv. Again, thanks to All Al

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Date: Fri, 23 Feb 2001 01:18:44 -0600 (CST)
From: Don Reaves <dr@cei.net>
Subject: Re: [R-390] URM-25

> .....operating instructions, and repair manual for the URM-25?.....

ftp://militaryradio.com/pub/militaryradio/Manuals/courtesy Nolan Lee

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Date: Wed, 5 Sep 2001 07:26:25 -0700
From: "Bob Tetrault" <rstetrault@home.com>
Subject: RE: [R-390] recommendation for rf signal generater

Buy a URM-25 from Fair or elsewhere, and use a counter. You can't buy a good, low cost, digital display sig gen. They are a contradiction in terms. The shielding has to be doubly or triply watertight, the attenuator has to be even better than that, and the counter is incidental. It's physical: shielding don't come cheap unless it's

used, and the URM-25 is the most readily available, though I prefer the HP606B, it has a better attenuator.

Date: Wed, 5 Sep 2001 11:58:25 -0400
From: Tom Leiper <twleiper@juno.com>
Subject: Re: [R-390] recommendation for rf signal generater

Agreed. And counters in that frequency range are CHEAP and accurate, and allow you to do other things like align your PTO.

Date: Wed, 05 Sep 2001 20:07:44 +0200
From: Heinz und Hannelore Breuer <hbreuer@debitel.net>
Subject: Re: [R-390] recommendation for rf signal generater

The URM 25 is a fine generator but might need some TLC. Ask for the mods from Electric Radio on this list if you get one. If you have a little more money to spend look for a HP 8640B. They are getting cheaper and can be found around $350 to $400 even on eBay. It has has all the features you want. There was a military unit HP 8640B opt.323 which is even cheaper but looks ugly (at least to my eyes). One or two featurs are missing with the opt.323 units but I can't remember exactly.

Date: Wed, 5 Sep 2001 21:40:55 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] recommendation for rf signal generater

Of course, you can't measure frequency while the output is cranked down to a few microvolts, the counters aren't that sensitive.

I counter (sorry, bad pun) this by running the generator at a high level output to a "T" connector, one output to the counter, and the other to an external attenuator, a HP 355D (0-120dB in 10 db steps). Sure beats turning the output level up to measure freq, down to use, up to measure freq again, etc.

Good attenuators are available fairly cheaply at that auction place, I was just outbid for an off brand equilivent of the 355D which sold for $10.50.

Date: Thu, 6 Sep 2001 01:12:40 -0500
From: "Bill Hawkins" <bill@iaxs.net>
Subject: RE: [R-390] recommendation for rf signal generater

Fair Radio used to have URM-25x attenuators at a reasonable price. They have excellent shielding and can be used easily in the configuration John describes. The one I got only had one overheated resistor in it. :-)

Date: Thu, 6 Sep 2001 03:16:19 -0400
From: Tom Leiper <twleiper@juno.com>
Subject: Re: [R-390] recommendation for rf signal generater

On the counter-ary, with the URM-25 you can use the high power output with a series resistor of value (in my case is 50K) to just allow the counter to work reliably, which has almost no effect on the calibration of the padded (adjustable) output. How many of your modern sand-state generators have TWO outputs, huh? Take THAT you sniveling, snide-assed silicon valley girls (wherever you are) !!

Date: Thu, 6 Sep 2001 21:22:07 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] recommendation for rf signal generater

> On the counter-ary, with the URM-25 you can use the high
> power output with a series resistor ..... <snip>

Ah, I can't do that with my HP606 or Logimetrics generators. Remember though, it's important to keep good shielding between the sig gen and the counter and the attenuator. I ended up using coax with two layers of shield when I needed to make critical measurements. Otherwise the high level output would leak enough out through the braid and be picked up directly by the radio under test, enough to distort the measurement. With the Heath Lab signal generator, I was able to measure a receive sensitivity of 0.03 micorvolt for 10 db S+N/N. I know this measurement wasn't valid, because the generator and the receiver were on opposite sides of the room, and there was no coax connecting them, just leakage from the generator.

Date: Fri, 7 Sep 2001 00:49:16 -0400
From: Tom Leiper <twleiper@juno.com>
Subject: Re: [R-390] recommendation for rf signal generater

That's true. They take it so seriously on the URM-25 that the high level output jack is actually switched and (I think) grounded when nothing is plugged into it. What I did was to modify an in-line 6 db BNC attenuator by taking it apart and removing the resistors that were in it and just leaving the 50K series resistor. After reassembly, I connected it directly to the generator and ran RG-55 (double shielded RG-58) from the output of the "attenuator" to the voltage potential undulation rate meter.

Date: Thu, 6 Sep 2001 23:06:40 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [R-390] recommendation for rf signal generater

> <snip> .....What I did was to modify an in-line 6 db BNC attenuator
> by taking it apart and removing the resistors <snip>.....

Exactly the thing to do. But did you mean the attenuator started life with a 50K series resistor? Doesn't sound right unless it's like 25 Kohms impedence instead of the usual 50 ohms. A 10 db 50 ohm pi filter would have 96.25 ohm shunt resistors and a 71.15 ohm series resistor. (values from the 10 db step of the HP606 output attenuator) Hard to buy those 1/2% precision resistors also :)

Date: Fri, 7 Sep 2001 07:27:53 -0400
From: Tom Leiper <twleiper@juno.com>
Subject: Re: [R-390] recommendation for rf signal generater

> But did you mean the attenuator started life with a 50K series resistor?

No. It was just an L pad, and I ripped everything out to use the nice little tubular case.

Date: Thu, 11 Oct 2001 13:45:59 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: RE: [R-390] Sensitivity Measurement

If you take the URM-25 attenuator apart be aware of the ball bearing/spring/phenolic post in the center of the housing!

Date: Fri, 12 Oct 2001 21:37:57 EDT
From: DJED1@aol.com
Subject: Re: [R-390] Sensitivity Measurement

The URM 25 attenuator is not a wavegide below cutoff- it's a resistive power divider. I know that the signal is not detectible on my R-390A when I crank the attenuator all the way down. An alternative is to shift the signal generator off frequency.

Date: Wed, 7 Nov 2001 01:52:57 -0800 (PST)
From: MICHAEL OBRIEN <mikobrien@excite.com>
Subject: [R-390] Tags on urm-25d

I just bought a urm-25 generator from fair radio (checked unit). It looks complete with all the adapters manual etc. When I was looking for one they disappered off the web and epay. My unit has 2 different tags on it the front panel has a urm-25d (with new screws) and the case has a urm-25j (1968?) Is there anyway of knowing which one I have and what version is a URM-25J?

Date: Wed, 7 Nov 2001 07:22:57 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Tags on urm-25d

The geneology of the URM-25 is a bit complicated -- Best bet is to post a photo of at least the front panel so some of the experts can take a look at it. But I'd also call Fair Radio while they still remember your unit. I think "RJ" is the URM specialist there and would have checked your unit, or Dave might know. Fair includes a partial manual copy with the checked units -- they most likely matched up the correct version, or as close a match as they could with the variety of manuals they have on file. Offhand, I'd suspect that a nice "D" with a banged up case got a different one, but there are those new screws. One thing to test is the modulation. Many of these give out after a while and go back on if you switch modulation off and on again. If this happens, there are a few caps to replace -- which Fair might have already done on your checked unit.

There is a compendium of tips gleaned from past posts on Al Tirevold's R-390 FAQ site http://www.r-390a.net/URM_25.txt Might be something of help there.

Date: Wed, 7 Nov 2001 11:24:51 -0500 (EST)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] Tags on urm-25d

I thought the URM-25J was a URM-25D with a different accessory or two. At least that was what I read on one of these lists awhile back.

Date: Wed, 7 Nov 2001 08:32:29 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] Tags on urm-25d

It's a D.

The tag is attached to the front panel.
The front panel is attached to the guts.
The is what makes the model.
The case is just there to keep the dust out.

Ok so some one droped a D model into a J case. Ah the wonders of interchangeable parts. The J version is the 9th or 10th version.

Date: Wed, 7 Nov 2001 14:49:40 EST
From: Llgpt@aol.com
Subject: Re: [R-390] Tags on urm-25d

..... URM-25J was a URM-25D with a different accessory or two.....

And, more attenuation stages in it.

Date: Wed, 19 Dec 2001 21:01:39 -0000
From: "Phil Atchley" <ko6bb@elite.net>
Subject: [R-390] URM-25D info?

I have a URM-25D here (with all acc in the lid) that I think may need some tlc. It does work and generates a carrier, seems remarkably accurate in frequency where I've tested it. BUT, it appears to have no 400 or 1kHz modulation. Any 'common' failure modes that I should look for first? I downloaded the manual for the URM-25F from the BAMA site but haven't looked at it yet. How does the 25D compare (circuit wise and mechanically) to the 25F? It appears that this would be a very good generator to align my longwave beacon receivers as it goes down to 10kHz.

Date: Wed, 19 Dec 2001 17:30:35 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] URM-25D info?

YES. The resistors and capacitors in the Twin Tee oscillator circuit have drifted. You need the "Overhaul Notes" written by Dallas Lankford and published by the folks who publish Hollow State news. Do not tear your generator apart without reading Dallas's notes. DO tear your generator apart and replace all, repeat all of the now leaking paper-foil capacitors in there.

You'll be glad you did.

> I downloaded the manual for the URM-25F

>from the BAMA site but haven't looked at it yet. How does the 25D compare
>(circuit wise and mechanically) to the 25F?

The circuit is very very close. Mechanically they are quite different.

>It appears that this would be a very good generator to align my longwave
>beacon receivers as it goes down to 10kHz.

YES this is right.

Date: Wed, 19 Dec 2001 18:08:29 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] URM-25D info?

I'm not the expert on these, tho' I should study up as I have a flock (gaggle?) of URM's, some of which need tending. However, looks like nobody has replied so far and I can tell you this much: Yes, there are common failure modes concerning modulation with the URM-25x's.

When Fair Radio sells a checked unit, they routinely replace 2 or 3 caps in that circuit. When I bought a "reparable" URM-25C a couple of years ago, they threw in the caps with it -- but I never got around to putting them in. The routine for the D model is similar, but different caps. I have an F model too (URM's for all occasions). That one still modulates as needed. The C has the more common preliminary failure mode -- intermittent modulation. Starts up when you switch it on, then quits. Switch the mod. off for a second, then back on, works again for a while. Phil, I don't know if that F manual will be much help.

As I recall Nolan Lee's explanation, there are substantial differences even between some adjacent letters -- like the C and the D. If my foggy memory serves best as it can, I think he said the F returned to the C style circuitry, though the front panel doesn't look the same. Whichever it is though, a buck or two in caps fixes it. Did you try switching the modulation on and off to see if there's anything there at all?

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Subject: Re: [R-390] URM-25D info?

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Date: Wed, 19 Dec 2001 19:27:54 EST
From: Llgpt@aol.com
Subject: Re: [R-390] URM-25D info?

The URM-25F has more attenuator steps that's the only difference.

Date: Wed, 19 Dec 2001 19:12:41 -0600
From: blw <ba.williams@charter.net>
Subject: Re: [R-390] URM-25D info?

It's good to hear from you again....and on this list too. I have a nice URM 25D that I bought from Fair Radio. It was $90 as 'unchecked' but I was assured that it would be checked over without the 'checked' price. You can't beat the service as they sent me the upgrade caps, xeroxed instructions, all accessories, and a replacement cover as the original case cover was heavily dented. I also got a little bag of spare bulbs and knobs. The 400 Hz and 1 mHz mod are 4 caps that have to be replaced. It sounds easy, but getting in there to do the replacement is very tight and you can't really disassemble it too far. You sort of disassemble it, pull one side board out as best you can in order to get to those 4 caps. Knowing your electronics background, you should find it easy enough. Anyway, it is a splice job. You need to replace C159, C160, C161, and C164. I don't have the value of those caps as I didn't write them down before installing them. Can you call R.J. at Fair, 419-227-6573 and ask him about the capacitors? If not, let me know and I'll call for you. I still have your address and will mail copies of my sheets to you. All you need is the value of those 4 caps with locations.

Glad to see you around this motley crowd. Your generosity and help has been greatly appreciated in the past. I'll get those sheets copied and out to you.

Barry Williams

Date: Wed, 19 Dec 2001 21:26:58 -0500
From: "Bruce Ussery" <bruceussery@hotmail.com>
Subject: Re: [R-390] URM-25D info?

My URM-25D manual (W7FG copy) says the 4 caps you mention were originally as follows:

C159,C164 = .01 uF +/- 20%, 300V paper
C160,C161 = 1000 pF +/- 2%, 500V mica

Which brings to mind the question: What do you guys use to replace mica caps these days? There is some basic troubleshooting info (sounds like you're right on target, as usual) at: http://www.qsl.net/k5bcq/URM/URM.html Also side by side photos of the D and F models. And sometime this year I found and downloaded a nice compendium of URM-25 notes someone compiled, but I can't find the url now. I'll check tomorrow and see if perhaps I still have the file on my workplace pc.

Date: Thu, 20 Dec 2001 16:49:31 -0800 (PST)

From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] URM-25D info?

Ok, here's what I know, When pulling the front panel out of the case the power supply stays inside the case, the two cords have to be unplugged, they are short, almost too short to run the unit with the front panel out of the case. A roll of electrical tape under the cast aluminum case makes the front panel sit still while running it outside the case.

Becareful of the two feed-through caps on the bottom of the front panel, they can be broken easily and should be relocated to the sides of the small case they protrude from. They can catch when removing the front panel from the case.

Now the caps in question are on the PC boards on the right side of the set. Inspect these closely to determine how you can move them out to gain access to the caps, if you look at what I saw you can just barely slide the wires over the posts and get some more room to work without major dis-assemblage.

Don't ask me to explain it, you'll see it before I figure out what words to use.

If you have the manual go through the resistance measurements, this will show any other problems, too.

While you've got it apart you have GOT to look inside the cast aluminum case, this thing is cool! The turret switch is a work of art. Good time to check and clean the switch contacts.

My 6BE6 had a crack in it,..... but it still worked!

Good luck getting the tubes out!!

Date: Fri, 21 Dec 2001 09:57:00 -0500
From: Bill Cotter <bcotter@pop.uky.edu>
Subject: [R-390] Re: URM-25x info

Speaking of turrets:

After going through several 25D's and 25F's, I've noticed that many have broken turret clamps, apparently a weakness in the casting. I've been fortunate enough to locate a few intact turrets to replace the broken ones that effected operation. And, some 25's don't seem to be effected when changing bands. I haven't tried it yet, but it may be possible to use some of the JB Weld techniques to repair the clamp. Given the nature of the clamp to maintain compression, I'm not sure even JB could stand up for a long time.

Date: Fri, 21 Dec 2001 09:46:35 -0600
From: blw <ba.williams@charter.net>
Subject: Re: [R-390] URM-25D info?

Be sure to ask for R.J. Lee. He is pretty helpful. He wrote a note with the shipment apologizing for the banged up case cover. The extra knobs and bulbs were nice to get. I originally called about a 'checked' unit and he explained what they do for the extra money. He suggested that I replace the caps myself and said he would pick out a very good one to send. I don't remember the checked price, but unchecked was $90. I don't remember the values of the replaced caps as the notes refers to 'red ones' and 'brownish ones'. I should have written it down to note on the schematics.

Date: Tue, 25 Dec 2001 19:25:45 -0000
From: "Phil Atchley" <ko6bb@elite.net>
Subject: [R-390] A URM-25D Success Story!

Howdy folks: Since I had time this morning (before going to the In-laws this afternoon) I decided to see what I could do about my lack of modulation on the URM. First thing I did was to check the email responses I'd received and check my "junkbox". YES! I had some nice new 1000pF, 5% 1000VDC silver micas. On the .01's I wasn't so lucky. But I did have some "pull" Mylar .01's at 630 Volts. checked and found a couple reasonably closely matched. Next, I pulled the unit out of the case and "surveyed" the matter. It quickly became apparent that this wasn't an easy task to do in the precise "remove and replace" way that I like to do things. So, get out the long nosed dikes, splice some wire onto the capacitors (the pulls had come from a
PC board, the NEW ones had short PC board leads also) and then splice the replacements into the original leads. NOT the way I like to do things! Fired her up and, voila! I have modulation and nice clean sounding tones of 400 & 1000Hz (or was it CPS in those days ;-) This unit was supposedly overhauled by "Tobyhana" in 1983. I must presume that overhaul didn't include capacitor replacement unless they were known bad! Man, dig all that cast metal in there. Now I know why the Navy liked these things. Run out of shells? Load a few bags of powder and then stuff a URM down the barrel. Probably would do more damage to the enemy than the "real thing". Now that I have it working, I have two sig Gens to cover this range (3 actually if you include a very funky Heathkit). The one I like is the SS Clemens, covers 50kHz to 54MHz and has calibrated slide attenuators etc. I may eventually end up swapping the URM off, it's too early to tell.

Date: Tue, 25 Dec 2001 17:29:03 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] A URM-25D Success Story! Long Reply (sorry)

T'was Christmas morning, and all through the house, not a creature was stirring, not even a mouse, except ol' Phil was a-tinkerin' with his URM-Twenty-Five, and lo' and behold the modulator's alive.

Lucky fella. What I wanna know, is where can I find a .15 mfd 1600 volt tubular, or a reasonable replacement thereof. More about that below ...

> Next, I pulled the unit out of the case and "surveyed" the matter. .....

Isn't it amazing how cooperative those 'lil electrons are? They'll just flow throught those lumpy connections like it was nuttin'. I'm sure your soldering job looks spiffy compared to what I did around the same time on the opposite coast.
>
> Fired her up and, voila! I have modulation and nice clean sounding tones of
> 400 & 1000Hz (or was it CPS in those days ;-)

You must stick to CPS with boatanchors and their accessories. Of course, these are convertable to Hz on an even exchange basis, less a 5% service charge. Careful though, the "tz" sound at the end is at the resonant frequency of some vacuum tube elements, filaments, and the like, so repeated use of the Hz, kHz, and mHz words will shorten tube life.

> ...overhauled by "Tobyhana" in 1983. I must presume,,,,,,,,,,,,,

The caps were probably still good then. Besides, the modulator usually goes intermittent some time before it fails altogether, so it probably at least mostly worked. The impression one gets is the function switch is a bit dirty, because if you switch it on and off modulation on the intermittent ones, they often start modulating again (for a while).

> Man, dig all that cast metal in there. .....

Yup, they look good in battleship gray, don't they. The enemy will become hopelessly confused and flee. Would go something like this: "I'm giving the order to flee!" "Sir, don't you mean retreat?" "No, this thing they shot at us has knobs and a dial, and even worse a handle on it. Probably a suitcase nuke. Run away! Flee! Gedowdahere! Every man for himself!" Actually, it may be a violation of the

Geneva Convention to fire de-milled URM's. No radium on the dials, but some components may contain PCB's.

.....The one I like is the SS Clemens, covers 50kHz to 54MHz .....

There ya' go again, Phil. Always swapping away the gear. No permanent relationship with the stuff -- more of a wham, bam thank you mam thing, eh? That's OK -- means someone will get a plug 'n play URM-25D somewhere. By coincidence I was using my URM-25F this afternoon to check out (another coincidence) a piece of Heathkit equipment -- an SB-610 monitor scope. The scope was DOA. Meticulously assembled, the assembler had neglected to solder two connections -- one of them on the power switch! But that's not all, a 330K resistor was burned through in the HV section. My cap checkers only go to 600 volts, the caps are 1200 and 1600 volts, so I didn't bother. A .15 mfd, 1600 volt tubular tested infinite on my ohmmeter, but apparently was failing at the operating voltage as a replacement resistor started to
burn up, so I pulled the plug -- and that cap. No suitable replacement on hand, I made up an unsuitable one -- a bundle of six 2kv .01 disks -- uuuugly! Replaced the replacement resistor and the thing works, after a fashion. There's some unevenness in the trace which I think is the scope's self-analysis telling me it would really rather have a tubular of the right capacity. There are also a pair of similar .10 mfd caps that make up a voltage doubler along with a pair of cylindrical selenium rectifiers. Probably should replace those too. So, my question is where to get 1600v or 2K tubular caps of recent manufacture. It's a bear to wade through the online catalogs.

Meanwhile, this monitor scope could be set up for a range of IF frequencies using alternative components that were supplied with the kit. This one was apparently set up for 3-6 MC, though the URM-25F states authoritatively that it is responding to 2.9 MC. (Sez so right on the dial -- it wouldn't lie, not to mention the modulator works on this one.) I'd like to make it do 455 KC, but a canned coil would have to be changed out. Anybody familiar with these? (Yeah, I know, wrong list.) As long as I've gone this far <yawn> I will share with you guys that someone, who will remain nameless, suggested that the siggen of choice is the HP 8640. Why, he even went so far as to say the URM-25x is "crude" and he wouldn't use it on an R-390(x). Hmmmph! The URM-25 is the official siggen of the R-390 - the one in the line drawings in the how-to section of the official manuals. (like Gatorade is to sports, etc.) Also, while I'm at it, there are other considerations -- with the proper wadding, you probably could fire a URM-25 from a 16 inch gun. Probably can't do that with the HP. Here's a test requiring no special (Iowa class) equipments -- close up one URM-25 of any particular letter denomination with all accessories in the lid and fasten with the spring loaded latches as per manual. Secure HP 8640 of any particular letter-model (B, etc) as best you can -- put the line cord and any accessories in a suitable container as this siggen lacks the wherewithal to store its own stuff. Test phase one -- Drop the URM-25x onto the HP 8640 from a height of 24 inches. Test phase #2: Drop what remains of the HP 8640 onto

barely dented URM-25 from 24 inches. Now, power up each unit and check functioning as per manuals. Sorry for all the bandwidth on this -- consider it a Christmas present, but don't try to return or exchange it tomorrow. `<;-)

Date: Sun, 28 Apr 2002 22:24:34 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
To: r-390@mailman.qth.net
Subject: [R-390] aligning an R-391 IF deck

Hi folks, I'm doing an R-391 alignment (390 non A), and hit a snag early on. When tuning the coil on Z-501, there is no change in the diode load voltage. I _think_ my earlier steps are good enough, but I'm not sure. I notice that with my URM-25D, the output frequency drifts fast enough that it is fairly difficult to find peak frequencies - even just turning the frequency generator knob carefully enough while peaking on the 0.1KC bandwidth setting is challenging. Is getting the coil (not the cap) on Z-501 sensitive to correct IF alignment prior to that point? Everything else was peaking pretty easily (though touchy due to URM-25 drift). Is dumping the URM-25 and getting a better siggen a reasonable idea? Will redoing caps and resistors stabilize it to any significant degree? The drift is about 10-20 cycles/minute (downwards), which is a pain when trying to align circuits trying to filter 100 cycles. Thanks for any advice, Paul

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Date: Mon, 29 Apr 2002 15:14:10 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] aligning an R-391 IF deck

There is something very wrong with your URM-25. Push and pull on the frequency set knob.. if the frequency changes much, the shaft end play mechanism is loose. Gotta fix that. Other wise something else is out of whack.

From: "Jim Temple" <jetemp@insightbb.com>
Date: Sat, 18 May 2002 12:20:51 -0400
Subject: [R-390] URM-25D manual

I have picked up one of these signal generators. The modulation does not work, as is the case with many of these models. The archives is a great source of information and tips for maintaining one of these. Does anyone know of a manual for the "D" model that is available on the web or in .pdf format? Thanks for your past support.

From: "Alan Johnson" <alanjohnson@gbis.com>
Date: Sat, 18 May 2002 10:03:31 -0700
Subject: [R-390] OT: URM-25F

This is off-topic, but... I picked up a 25F at a hamfest last week and I would like to know if there are any "must check/fix" items that must be attended to prior to firing up the unit. Also, does anyone know of a reasonably priced source for Collins FA series filters for the 75S-3B/C receivers? I need an AM filter.

From: "Jim Temple" <jetemp@insightbb.com>
Subject: Fw: [R-390] URM-25D manual
Date: Sat, 18 May 2002 13:04:04 -0400

WOW, that was fast. The "D" model Navy manual is available in .pdf format at http://www.kg7bz.com/Manuals.html Thanks for the quick responses!

From: "Jim Temple" <jetemp@insightbb.com>
Date: Mon, 24 Jun 2002 12:20:07 -0400
Subject: [R-390] URM-25D recap.

I picked up a URM-25D at Dayton this year. This unit had the typical loss of modulation described in many of the messages posted in the archives. Upon inspection, ALL the large paper caps located on the modulation board were physcially wet with a slick discharge from the innards of the caps. So I obtained replacements and installed new caps as recommended in the archives. I even broke open the case and replaced all the similar paper caps located on the various internal modules, which were also wet with a discharge. Upon reassembly, all functions work as intended, and after a few hours warm up, the stability of the unit is rock solid. Now on to my question: in the list's experience, is a recalibration necessary after recapping this unit? The frequency alignment seems to be quite good. But I am uncertain about the calibration of the voltmeter function. I have the Navy manual for the URM-25D, but am interested in tips on calibrating the voltmeter function. For instance, 2.0 volts are mentioned as an approximate value at the RF output jack. Is a RF voltmeter required for this measurement? Is this voltage a DC voltage? Any help here? Thanks for your past support. Jim

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From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] URM-25D recap.
Date: Mon, 24 Jun 2002 14:15:30 -0400

Yes, an "RF" voltmeter is required here. The signal IS alternating current, not DC. All AC voltmeters have a frequency passband. The typical "panel" meter, used to measure, say, 0 to 150 volts AC will be accurate only at the 60 Hz AC power line frequency. A voltmeter used to measure, say 10 Mhz, must have a passband going up to at least that frequency. An excellent meter for this purpose is the Hewlett Packard model 410-C, which goes up to (I think) around 700 Mhz. The older (and much cheaper) model 410-B will work just fine too, if you can find one that still works properly. Chuck N1LNH

Date: Mon, 24 Jun 2002 15:31:17 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] URM-25D recap.

>Yes, an "RF" voltmeter is required here. An excellent meter for
>this purpose is the Hewlett Packard model 410-C,

URM-25 Calibrators, I agree, but there is more. Indeed it is, but what if such a thing is not available? All is not lost. Lets make some assumptions:

1) High accuracy is not required.

2) The voltmeter circuit in the URM-25 measures accurately enough for our purpose across the frequency range of the generator.

3) If an AC meter is available that can measure well enough at a few hundred KC or even much lower, then we can use it to set the URM-25 calibration.

4) The manual for any meter that is available will give some idea of the accuracy to expect at a few hundred KC or lower.

If we can accept these ideas, then the procedure would be as follows:

1) Get whatever AC meter is available, and figure out what accuracy you can expect from it.

2) Calibrate the URM-25 with that meter.

3) Call the project done.

A couple of alternate methods come to mind:

Method A: Find some recommended AC voltage detector circuits useful at the frequencies of interest. Build one and assume the measurements are close enough. This method may well involve very few components (one diode, one resistor, one capacitor and a way to mount them), and a DC voltmeter of moderate accuracy. If a circuit reported to have good performance is duplicated carefully, the results for these purposes should be quite good enough.

Method B: Build such an AC voltage detector and mail it so someone who does have the likes of an HP 410C for calibration by comparison at some frequency(ies) of interest. Upon its return, use it to do the calibration.

Notes:

1) I seem to remember that the output calibration of the URM-25 depends on setting the signal generator section output, at the input to the attenuator, to 2 volts rms. (I believe that the GR 1001A and the HP 606 are similar.) Making an ac voltage detector that works well at 2 volts and over a limited range of low to moderate frequencies would be a rather simple job. The URM-25 output voltage specifications is based on at last the following points:

A) Calibration of the 2 volt point is done as specified,
B) The RF attenuator is working properly.
C) The generator output is terminated properly.

2) Making very accurate RF voltage measurements over a wide range of frequencies is quite involved. Careful study of the specifications of the HP RF voltmeters and similar general use laboratory quality instruments will give an indication of the accuracy attainable in production equipment. A look at the following URL, which explains the RF voltage calibration services available at NIST, reveals that at 100 MC and above, peak to peak detectors can be calibrated to 1.2 percent. No one in the country can do better. (Think about that next time someone reports the sensitivity of a radio receiver to two or three significant digits.)

http://ts.nist.gov/ts/htdocs/230/233/calibrations/Electromagnetic/Voltage.htm#534

3) An AC voltmeter that works well up to frequencies beyond the range of the URM-25 is simply not necessary.

Date: Mon, 24 Jun 2002 18:35:17 -0400
From: Jim Brannigan <jbrannig@optonline.net>
Subject: Re: [R-390] URM-25D recap.

I've checked my URM-25 output against my HP 410-C and Tektronix scope..... various frequencies, etc. The numbers all sorta' agree....close enuf for government work... I agree with Roy. I have a shop, not a lab. I'm more interested in relative readings than absolutes. Repeatability and comparison from a shielded controlled source, at a known resistance is important.

For example If a "2" on the URM-25 voltmeter produces the same output on two different receivers, they have the same gain. If a "2" at the RF stage produces the same output as a "1" at an IF stage, I have gain. The amount of gain can be worked out with a step attenuator. Whether the sensitivity is .8, .008 or .0008 is immaterial at HF because of atmospheric noise.

Date: Sat, 17 Aug 2002 14:45:57 -0700
From: shadow <shadow@gilroy.com>
Subject: [R-390] ???? about URM-25D Mod and Notes / Dallas Lankford

Hi Guys..... I need some help and information.... I have read questions about URM 25-D and from time to time and questions about the hollow state news letter article on this unit. Even as late as last week. When I purchased and picked up my two 25 D today. I received a package of hand written notes and hand drawings from Dallas Lankford about the URM-25D. Dated 11-88 and Rev 1-94 There are 26 pages of hand written notes...

My question is.... Has anyone scanned them before and posted them to a WEB site. So the entire group can view them.

The notes are old and its hard for me to believe. That someone has not posted the a site or scanned them. So they can be email to someone, that may need them.... I'm thinking that they may be the same notes as in the hollow state news letter, or maybe even the early version of them. I do not think the news letter used hand written notes. But... I have tried to find the article before, but no luck.. If the notes are needed, then I may scan them. If not, then I'm not going to take the time... So I need some information and help...

Date: Wed, 21 Aug 2002 06:09:50 -0700
From: shadow <shadow@gilroy.com>
Subject: [R-390] Dallas Lankford / Mod notes / URM-25D

I have scanned the Mod notes. Walt (W2OKF) is going to convert them to a PDF file. When completed.... The people that have requested them, will receive them.

Date: Sat, 04 Jan 2003 19:05:46 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] kilocycle/megacycle movement

There is nothing particularly magic about the URM-25 generator. Obviously it's the one in the TM's and that is a nice thing. Other than that there are other generators both tube and solid state that will do the job very well. Several of the HP tube type generators come available on a regular basis at a price below what you usually see URM-25 going for. For that matter the radio will wind up working every bit as well set up properly with your Heathkit as it will with a URM-25. Now, an analog VTVM is something that you can't easily replace ...

From: "Kurt Schnabel" <classicmotorcycleclub@hotmail.com>
Date: Fri, 17 Jan 2003 16:55:40 -0200
Subject: [R-390] URM 25 D Signal Generator

I am trying to repair two URM 25D Signal Generators but I need the schematics. Is there any Site which I can download it? Many thanks for any info!

Date: Fri, 17 Jan 2003 13:13:24 -0600
From: r390a@enteract.com
Subject: Re: [R-390] URM 25 D Signal Generator

http://bama.sbc.edu/ under 'Military Test Gear'

Date: Fri, 17 Jan 2003 15:05:14 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] URM 25 D Signal Generator

You also need any or all of the following, ESPECIALLY Dallas Lankford's Overhaul Notes: Hollow State Newsletter Issue 41, Spring 1997
- URM-25D Rebuild Notes Supplement (about the Terminal Board, Courtesy of Ray Mote) HSN Issue 34 Winter 1994-95. Short Subjects: "Balky Modulation Oscillator in the URM-25, by Allan Douglas (about the R-C "T network" and padding a capacitor to make it work again)

E-mail from Nolan Lee to Roy Morgan Dec 22, 1998 advising to replace the coax cables found with URM-25's since they are often lossy, replacing the coupling cap in the "Test Lead" to prevent damage to the attenuator, and checking all cap and resistor values in the generator.

URM-25D Overhaul Notes by Dallas Lankford 11-88, revised. 1-94, with copy of HSN Supplement from Issue 41 about the "Terminal Board".

Signal Corps SSTS Operation Sheet 51038, "RF Signal Generator Set AN/URM-25D Operation and Calibration" U.S. Army Signal Center and School, Fort Monmouth, N.J. 17 pages

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Date: Fri, 17 Jan 2003 15:10:12 -0500
From: Mike Sullivan <vze344qr@verizon.net>
Subject: Re: [R-390] URM 25 D Signal Generator

Roy, where can one find all these goodies on the URM-25D??

From: "Jerry Kincade" <w5kp@direcway.com>
Date: Sun, 19 Jan 2003 13:31:52 -0600
Subject: [R-390] For Sale: SG-1144/U Sig Gen (Solid state successor to the AN/URM-25 series)

Hi fellow sore-wristers, I have an HF sig gen for sale, an ex-military SG-1144/U. This is a solid state general purpose 50 KHz - 80 MHz unit with a metered and leveled output range of -127 dbm to +10 dbm in five freq bands. Puts out CW, AM (400 or 1000), and FM (0-75 KHz deviation, FM modulation available above 28 MHz only). Red LED 4-digit freq counter built in. Built in the early 80's. I believe this was the general purpose sig gen that replaced the AN/URM-25(x) series. I have used it on my bench and it is very stable after warmup and works just fine on all ranges and modes. Modulation deviation and percentages were checked against my Racal 9008 mod meter and were very accurate. The output attenuator was tested against a lab grade millivoltmeter down to -50 dbm (as low as I could test it) and is also very accurate. Standard operating method is to "T" the output to a "real" freq counter, use the sig gen's 4-digit LED freq counter to get in the ball park, then tweak the freq fine tune to home in. About 16" x 17" x 7", 31 pounds. Front panel is very good, case is decent with a beige (!) repaint job over the military grey, a few chips in the paint. $80 plus shipping will buy it, and although I can't guarantee NIST calibration, I will certainly guarantee it all works as advertised. A couple of digital photos are available to email if somebody wants to see it. 73, Jerry W5KP Mustang, OK

Date: Sun, 19 Jan 2003 14:27:24 -0600
From: r390a@enteract.com
Subject: Re: [R-390] For Sale: SG-1144/U Sig Gen (Solid state successor to the AN/URM-25 series)

A manual for this puppy can be found at the ETM site:
http://www.logsa.army.mil/etms/find_etm.cfm

From: "Jerry Kincade" <w5kp@direcway.com>
Date: Sun, 19 Jan 2003 17:07:57 -0600
Subject: [R-390] SG-1144/U sig gen is sold.

The sig gen is sold. Thanks for all the interest, wish I had enough of these to go around... I'm a bit surprised I haven't heard them mentioned on the list. All I hear about are AN/URM-25's, but there must be a zillion of these 1144's out there somewhere. I've used both, and IMHO this is hands down a nicer generator to work with. Maybe it's because it only has a four digit freq counter... but that's four more than the 25's have. :-) 73, Jerry W5KP

From: "Bryan Stephens" <mail08458@pop.net>
To: "R-390 List" <r-390@mailman.qth.net>
Subject: Re: [R-390] URM 25D Signal Generator
Date: Sun, 7 Dec 2003 11:51:48 -0500

IIRC, there is a URM-25D manual available for download on the K4XL's BAMA site (http://bama.sbc.edu/)

However, if anyone needs a hardcopy of the full URM-25D manual (theory/operation/maintenance/parts),
I still have a batch of very high quality reprints (hi-res scan from my original w/clear photos, 11x17 schematic, 24lb paper, 67lb covers) for $6/ea + postage. If interested, please contact me directly (bryanste@yahoo.com).

Bryan Stephens
bryanste@yahoo.com
KG4UPR
Potomac Falls VA

Date: Sun, 7 Dec 2003 10:21:49 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] URM 25D Signal Generator

Speaking of signal generators, how does the URM-25J stack up against the others mentioned? Is it substantially better than the "D" model? Just what are the differences?

Date: Mon, 08 Dec 2003 11:05:53 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] URM 25D Signal Generator

>Speaking of signal generators, how does the URM-25J .....

My guess is: about the same.

>Is it substantially better than the "D" model? Just what are the differences?.....

Can't tell you, but my notes on the URM-25 include the following messages. I assume that "more attenuation stages" means an additional step in the output attenuator. I do not have pictures with enough clarity to see if this is true or not.

Date: Tue, 6 Jul 2004 13:46:17 -0700
From: "Jack Antonio" <scr287@sbcglobal.net>
Subject: Re: [R-390] URM-25 RF output measurement

<snip> Also, I've owned two URM-25s, a D model and F model. The output attenuator in each is basically a bunch of resistors in a super fancy rotary switch arrangement, the last resistor being a precision resistor in the neigborhood of 50 ohms.(49.9? 50.1? can't remember exactly). In both of my URM-25s, this resistor was burned open. Then, to add insult to injury, back when Fair was selling the URM-25 output attenuators, I ordered one, and this resistor was open in that one as well! Hope this helps someone.

Date: Wed, 07 Jul 2004 07:36:18 -0400
From: "Veenstra, Lester" <lester.veenstra@lmco.com>
Subject: RE: [R-390] URM-25 RF output measurement

Assuming the response is modest, I offer my service to measure URM-25(x) at a number of significant freqs and levels (but please do not ask for every MHz at every 5 dB). So, since my days of actually working on 25's is lost in memory: what would be an appropriate set of frequencies and levels that should be verified, according to the real experts here on the "net"? The selective level meter in its relative mode should make checking out the attenuator for discontinuities a simple process. I use a pair of HP-436 power meters with standard and high sensitivity heads and an HP-3586 selective level meters.

Date: Mon, 12 Jul 2004 16:06:44 -0400
From: "Veenstra, Lester" <lester.veenstra@lmco.com>
Subject: RE: [R-390] URM-25 RF output measurement

The following is useful when URM-25x meets modern test equipment

dBm	watts	volts RMS 50 Ohm	volts P-P 50 Ohm
20	0.10000	2.23607	6.325

15	0.03162	1.25743	3.557
10	0.01000	0.70711	2.000
5	0.00316	0.39764	1.125
0	0.00100	0.22361	0.632
-10	0.00010	0.07071	0.200
-20	0.00001	0.02236	0.063

dBm	watts	volts RMS 50 Ohm	volts P-P 50 Ohm	MicroVolts
-7.0	2.00E-04	0.1000000	0.283	100,000
-13.0	5.00E-05	0.0500000	0.141	50,000
-21.0	8.00E-06	0.0200000	0.057	20,000
-27.0	2.00E-06	0.0100000	0.028	10,000
-33.0	5.00E-07	0.0050000	0.014	5,000
-41.0	8.00E-08	0.0020000	0.006	2,000
-47.0	2.00E-08	0.0010000	0.003	1,000
-67.0	2.00E-10	0.0001000	0.000	100
-87.0	2.00E-12	0.0000100	0.000	10
-107	2.00E-14	0.0000010	0.000	1
-127	2.00E-16	0.0000001	0.000	0.1

Date: Fri, 20 Aug 2004 11:27:49 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] RE: Mechanical filter repair

<snip> A short piece of 1-inch copper tube, two end caps, and a couple of BNC connectors make a fine substitute for those often-missing URM-25 accessories: the 50 ohm load, standard antenna, impedance converter, and voltage divider. Clever workers will mount a Twinax connector on one end and incorporate the needed grounding of one twinax terminal, proper loading of the generator, and the advisable 10:1 or 100:1 voltage divider all in one unit.

Date: Sat, 8 Jan 2005 22:19:07 -0500
From: <pdulaff@earthlink.net>
Subject: [R-390] Servicing Advice on Signal Generator URM-25D

Blank L117 has failed on my signal generator. The choke shorted to ground and also took out the 6X4 power supply rectifier. While I am waiting for the parts to

arrive to complete this fix, what else in the unit should I change as a preventative maintenance item ?

Date: Sun, 09 Jan 2005 10:22:45 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Servicing Advice on Signal Generator URM-25D

The basic experience on an R390 seems to apply to a lot of older tube based gear. Pretty much:

1) Replace the electrolytic capacitors, especially the ones in the power supply.
2) Replace any of the black or brown body tubular paper and foil capacitors.
3) Look for any high wattage carbon comp resistors and check them. Replace if they are more than 30% out of value.

Different pieces of gear run at different temperatures. That seems to make some of them more prone to parts failure than others. I still claim that it is just a matter of time for some of the parts. The parts listed above show up on lists for just about every piece of gear out there. I'm not sure what took out your choke. It may have been a wear out mechanism or it could have been some kind of line transient. One of the interesting failure mechanisms on a choke is a short on the output that heats the poor thing up. Heat attacks the insulation on the winding. Insulation breaks down next time power is applied. Result is a short to ground. Makes for a good argument to fuse the B+ lead. In an R390 it makes for a good argument to be sure the B+ fuses (we all do the B+ fuse mod don't we ...) are the correct size and type.

I would replace the tube rectifier with a pair of silicon diodes and a 47 ohm 5W resistor. The rectifier tubes just aren't worth tracking down any more. The same comment goes for just about any supply in any of these older pieces of gear.

Now for the nasty part.

Once you get the URM back to life you have to calibrate it. Like all military gear there's a manual somewhere that tells you more than you would ever want to know about how to do it. The same thing applies to stuff like TV-7 tube testers. We all (my self *very* much included) seem to overlook this little chore all to often ....

Date: Sun, 9 Jan 2005 21:42:46 -0500

From: <pdulaff@earthlink.net>
Subject: Re: [R-390] Servicing Advice on Signal Generator URM-25D

Thanks for the input. I have it on the bench now. It is very well built. There aren't any black beauty caps in this thing. They use metal tubular decoupling caps that is flange mounted with a glass seal for the terminals. Resistors look like new but I will check them for increase in value. The RF choke that shorted to ground looks like the plastic terminal that holds the end of the wire had cold flowed over the last 40 + years and changed shape enough that the terminal contacted the ferrite core of the choke and shorted that side of the choke to ground. I have the manual for the unit and was studying it since I figured I had better check both frequency and signal output calibration after I get it back together. Another thing to consider on these units is lubricating the worm gear for the turret drive . Works OK but the grease is all dried out.

Date: Mon, 10 Jan 2005 08:08:04 -0600
From: "Dallas Lankford" <dallas@bayou.com>
Subject: Re: [R-390] Servicing Advice on Signal Generator URM-25D

Sure. Let me prerface my remarks by saying that much of what is said about preventive maintenance on the reflector is baloney. Take, for example, the "resistor replacers." You can't measure most resistors accurately in circuit unless you "lift at least one end," and if you do that, you might as well go ahead and replace it. Ditto for the "capacitor replacers." Unless there is some strong reason to replace a component (it is burnt dark brown or black, cracked case, oil leaking out, hot enough to boil water, etc.), leave it alone. Just because the case of a capacitor is black or brown does not mean it should be replaced. To illustrate how silly that is, I could say (tongue in cheek) replace all capacitors with a yellow case. Would you do that?

There are, of course, a few cases where you should replace capacitors. The mechanical filter blocking capacitor of an R-390A is an example of such a case. Now I don't really believe the story that the R-390A filter blocking capacitor failed in some R-390A many moons ago, and the operator switched through all the filters "killing" all the filters before he discovered what had happened. But because I don't want to tempt fate, I have replaced that cap with a disc ceramic cap having a much higher voltage rating in all of my R-390A's. And any black case cap in an SP-600 should be replaced immediately before you even turn it on (but you can usually see the cracks in the cases of the SP-600 "black beauties"). As for the URM-25D, every one I have seen has tan cased MicaMold oil filled capacitors, and at least one of those is leaking oil. Some of them are tough to get to, but every one should be removed and replaced. I like the "yellow wraps" available from AES for replacements.

Personally, I would never convert any tube rectifier power supply to solid state, if only for aesthetic reasons. Tube rectifier power supplies "come up gently." If you

convert to solid state, every time you turn your gear on is like hitting it with a big hammer. And anyway, what is the point of removing tubes from tube gear? Too cheap to buy the appropriate rectifier tubes? If we are going to remove the rectifier tubes, let's remove all the tubes!!! And then why buy tube gear and convert it? Let's just buy stuff that is already all solid state!!!!

And electrolytics... dare I bring up that topic again.? I think not because the doctor is probably lurking and I am not in the mood right now for a tussle. But here is a war story I don't think anyone can object to. A European friend of mine sent me his Telefunken E 1501 to fix. While fixing it I noticed that the power supply was quite noisy (loud mechanical hum). The E 1501 is modular, so I removed the power supply module to give it a look-see. While I was examining the power supply I noticed that a previous owner replaced two of the electrolytics in a misguided attempt to reduce the mechanical hum. Why have I concluded this? Because the "zipper crew" did not remove the old elctrolytics, but merely "scabbed in" the replacements. So I measured the resistsances of the old electrolytics with my DVM. They seemed fine (no shorts, no leaks, reasonably high resistance after charging for a while). Later I will actually power up the electros with a DC supply and check the m for leakage under operating voltage. If they pass that test, I will remove the replacements and restore the originals. I gave seen this kind of thing before in a Hammarulnd HQ-180A. Fortunately, that zipper crew also left the old electrolytic can in place, and I restored it. Have fun, Dallas

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Date: Mon, 10 Jan 2005 20:43:26 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Servicing Advice on Signal Generator URM-25D

I asked this back a few years ago and maybe it's time to ask it again. Has anybody seen any of the black or brown body/epoxy coated paper and foil capacitors made in the 1950's and 1960's show up good?

As originally asked the question was specific to the R-390. Since then I have seen a bunch of posts on a number of reflectors about these parts. They all seem to indicate these parts are a problem.

At least in my experience, testing pulls from a couple dozen radios they show up leaky (as in 5X out of their original specification) roughly 80% of the time. They show up at least 2X the specification >90% of the time.

Certainly there are places where you will not notice leakage even if it is 5X the specification. Most of these seem to get used in high impedance circuits where you will notice the effect though.

Date: Tue, 11 Jan 2005 11:18:38 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Servicing Advice on Signal Generator URM-25D

>I change as a preventative maintenance item ?

All the resistors and capacitors in the Twin Tee audio oscillator circuit.
All other paper capacitors.
You really should have the Dallas Lankford 18-page document:

>URM-25D Overhaul Notes by Dallas Lankford 11-88, revised. 1-94, with copy
>of HSN Supplement from Issue 41 about the "Terminal Board". (The Overhaul
>Notes themselves did not appear in HSN, only a notice that they were
>available separately.. There are about 18 pages if I remember
>correctly. Dallas has not made a similar set of notes for the -F model,
>unfortunately.)

You can get a copy from the editors of Hollow State News for a modest sum. It will be the best modest sum you have ever spent if you intend to keep your URM-25D running indefinitely.
---Date: Tue, 18 Jan 2005 00:26:32 -0600
From: Tom Norris <r390a@bellsouth.net>
Subject: [R-390] HP-606* vs URM-25*?

I've had a URM-25D for years and have never had any problems. I ran across an HP-606A recently and it's in the process of being shipped. I've never used a 606, (though I've used a 608 for higher freqs.) How does the HP-606 compare to the URM-25D? At the very least, it seems to be heavier.

Date: Tue, 18 Jan 2005 01:39:05 -0800
From: "ELDIM" <eldim@att.net>
Subject: Re: [R-390] HP-606* vs URM-25*?

The HP-606A is definitely a step up from the vintage AN/URM-25(*) series Signal Generators. However, the URM-25 Series did have a feature that I admired and appreciated which was the external X200 microvolts that was sure handy to keep a Freq Meter connected to.

The 25 covered 10 KHz to 50 MHz in eight ranges, whereas the 606A covers 50 KHz to 65 MHz in six ranges. The 25 is smaller, lighter, and takes up much less bench space but that is where it ends.

The 606A has much better accuracy of 1 % plus 100 Khz & 1 MHz internal Calibrator. The 606B was another step up but required the HP 8708A Synchronizer that provided PLL plus some more amenities. Of course, you can use it without the synchronizer and essentially you still have a 606A. The 606A sold for $1350 back in 1963. I have used both in the Air Force from 61 but the 25 was replaced by the 606A somewhere along the line. Wealso had a HP-608 Series which covered 10 MHz up to 400 + Mhz depending on the model.

This was also a very nice generator for its time and its' earlier military counterpart from the AN/URM-26 series. In any event, either generator is very capable of aligning radios receivers from the bygone era. You're sure to fall in love with the 606A on your journey to upgrade. I now use the 8640B which is the "cats meow". There are a lot of other signal generators that fill the bill as well.

Date: Tue, 18 Jan 2005 02:22:13 -0800
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] HP-606* vs URM-25*?

Glen, I have all of them plus the 8660C which is the Tiger of the bunch, for sure.

Date: Tue, 18 Jan 2005 08:00:58 -0500
From: "B Riches" <bill.riches@verizon.net>
Subject: Re: [R-390] HP-606* vs URM-25*?

I uses both when I was in the Air Force in 1960 - Both good units but wait until you use the 606 - great generator. Congrats!!!!

Date: Tue, 18 Jan 2005 07:27:35 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] HP-606* vs URM-25*?

I've had both and liked the 606 much better...so much so that I gave my URM-25 away. The 608 is a great machine as well especially the "E" model. I now use an 8640B but still keep the 606 on the bench as well and use it often.

Date: Tue, 18 Jan 2005 12:13:46 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] HP-606* vs URM-25*?

The synchronizer was not required. The B version of the generator had very few differences compared to the A. The ones that I can think of are:

- facilities to use the synchronizer: DC voltage output proportional to the dial setting, a variable capacitance in the oscillator L/C circuit, and input/output connectors for the needed signals.

- possibly a changed RF output stage to avoid the danger of short tube life if you run it at the max output level.

- possibly some solid state parts in the power supply

By the way, the later versions of the HP-608 also could use the synchronizer. With both the 606B and the later 608's the synchronizer gave you essentially crystal control frequency stability, FM capability and other esoteric features.

> Of course, you can use it without the
>synchronizer and essentially you still have a 606A.

Exactly.

>... I now use the 8640B which is the "cats meow".

I don't have one yet, but I understand that the prices are coming down steadily on this one. The 8640 will do about all you ever need a signal generator for. Except be repairable if you blow out the output solid state hybrid module by transmitting into it with a transceiver.

> There are a lot of other signal generators that fill the bill as well.

My very favorite is the General Radio 1001A Standard Signal Generator. Old, heavy, pretty simple, has odd output impedances, but oh, so nice to run. Like the door on a Rolls, it goes Klunnkkk when you change bands.

Date: Tue, 18 Jan 2005 12:35:37 -0500
From: N4BUQ@aol.com
Subject: Re: [R-390] HP-606* vs URM-25*?

...and it has that "high-voltage" output to drive the frequency counter!

Date: Tue, 18 Jan 2005 12:10:03 -0600
From: "Marshall M. Dues" <mmdues@hal-pc.org>
Subject: Re: [R-390] HP-606* vs URM-25*?

The HP-606B has an all solid state +300 volt, -200 volt, and +25.6 volt regulated power supply. It also has an all solid state calibrator A2 assembly. The rest is TOOBS. I used one in the avionics business for years, and have one in my hamshack now.

Date: Mon, 17 Jan 2005 20:32:24 -0500
From: "Michael Murphy" <mjmurphy45@comcast.net>
Subject: Re: [R-390] HP-606* vs URM-25*?

I have a 608F which I got from work-FREEBIE. What a glorious monster. I also have a late model 606B (1972 Vintage) that I just got this spring at the local junk store. It had busted meter glass and I offered him $35 for it. Short story, I dragged it home and it fired up! It is in the modern HP white ivory color (not the grey or tan) and let me tell you it is one fine piece. I replaced the glass using an old fashioned glass cutter on an old pane. Never having had this kind of gear in the shack before, I now feel spoiled! This truly is the golden age of test vintage equipment.

Date: Wed, 19 Jan 2005 12:47:10 -0800
From: "David Wise" <David_Wise@Phoenix.com>
Subject: RE: [R-390] HP-606* vs URM-25*?

I got mine at eBay for around $250 less shipping. It was partly operational and missing a couple of knobs. I was able to replace them with generic ones from RS with some judicious drilling and gluing. (Thank goodness the original skirt was still there!) I felt that the Band and FM Deviation had too much detent. It's easy to soften it; they use multiple leaf springs, just take a couple out. I don't know if it's endemic, but it had several cracked nylon gears and plastic switchplates. I was able to repair them, but those little contact fingers are hard to keep track of when they fall out. I glued them back on with epoxy.

Option 001 is a variable-frequency modulation source, very handy. You may be spot it in a photo, look for a viewing window in the second knob from the left.

Option 002 extends the frequency to 1024MHz.

Option 003 is reverse power protection to 50W. These have a stick-on label above the RF Out connector.

Option 004 is an extra-precise step attenuator and modulation cal. The single big rotary dial at the right is replaced by two smaller ones sort of side by side.

Date: Fri, 25 Feb 2005 22:20:09 EST
From: DJED1@aol.com
Subject: [R-390] URM-25 replacement

For the last 5 years I've beeen doing my alignments on my R-390A with a URM-25 I got from Fair Radio. It's worked OK, as long as I put a frequency counter on it to get on frequency. But as I was repairing it a couple of weeks ago I saw that it was from 1952, and decided it was time for an upgrade after 50+ years of service. I looked at the HP signal generators on the e-place, and

picked up an HP 8660A for only $300 (not bad for something that cost $25,000 when it was new). The R-390s certainly hold their value better- I think they only cost about $2000 new and are worth over $500+ now.

Anyway, it's quite a change from the URM-25. The 8660 was one of the first synthesized generators (mine has a binary display!), and can be set to the nearest cycle. The one I got has a plug-in that covers .01 to 110 MHz, so it matches nicely the capabilities of the URM-25. I struggled with how to test this thing- I expected that I couldn't zero beat to better than 10s of cycles because the receiver audio will cut off at very low frequencies, so how to tell if it worked as specified? I decided to try and measure with an offset so that I had a beat note of a few hundred cycles, then put the frequency counter on the audio output and measure the beat to a cycle. It worked very well- I could measure an offset against WWV down to about+- 1 cycle when the modulation was off. After warming up the generator, I set it to 15.000300, fed it into the R-390A along with WWV, and measured the audio beat as exactly 300 cycles. So it looks like the old 8660 still is working well. I checked the attenuator and it seems to be working OK, so tomorrow I will measure the sensitivity of the receiver, which the URM-25 measures as 0.3 microvolts or so. The 8660 goes down to 0.03 microvolts, so I should be able to tweak the receiver as never before. The only drawback is that the 8660, unlike the URM-25 is definitely not portable- it's about 65 pounds. It may be easier to carry the receiver to it than vice-versa. Ed WB2LHI

Date: Sat, 26 Feb 2005 10:38:57 -0800
From: Jack Antonio <scr287@sbcglobal.net>
Subject: Re: [R-390] URM-25 replacement

Bob's post reminded of something I saw in my URM-25s. The URM-25 generator uses a switched series of resistors in its output attenuator, the last being a 50 ohm-ish to ground. (It's not 50 ohm but either 49.9 or 50.1 or something like that, can't remember which). In both of the URM-25s I have owned, that 50 ohm resistor was open. Unless you actually measured the output of the generator, you probably wouldn't notice the problem.

Then, a couple of years ago, Fair was selling the attenuator assembly as a separate part, and I bought one. Guess what? That resistor in that was open as well.

Another thing to check on your URM-25s

Date: Sat, 26 Feb 2005 16:44:03 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] URM-25 replacement

According to the manual on Bama the magic resistor is 59 ohms. It is DC coupled to the output jack. If you hit the output jack with 12 volts then E^2/R gets you up

above 2 watts. Most 1/4 watt metal film resistors aren't going to take that for a real long time ....

The interesting thing is that it's always the final resistor that blows. The 65.6 ohm parts in the rest of the attenuator aren't all that less likely to blow out.

With R-390 type stuff I would suspect the whole attenuator goes if you have B+ on the antenna connector. Not to mention a bit of a surprise to who ever is working on the radio.

Sounds like a great way to rig the generator to get everything to pass

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Date: Mon, 28 Feb 2005 17:50:04 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] URM-25 replacement

URM-25 folks, I got both a URM-25 and a URM-26 this weeekend. The URM-26 (20 to 440 mc or so) uses a waveguide beyond cutoff attenuator, so there is only one single resisor in the attenuator. The URM-25 is a switched ladder attenuator. I checked mine by measuring the dc resistance at the output jack. One setting (1 uV) was way above 50 ohms - something like 700. Crispy critter resistor at that spot! Another was modestly off and all the rest were close to 50 ohms. Gotta find some proper resistors to repair that attenuator!

> They switch in a variety of fixed attenuators to make up your final
> attenuation value. At any given setting you may have a fairly small
> number of pads in the circuit. With an external attenuator and a receiver
> (R390 recommended) you can step through the entire range of the
> generator. Since the attenuator is the part most likely to fail in a
> non-obvious way it's worth doing on a "new to you" generator.
>
>Checking the pads you use is probably a good idea. It turns out you can do
>a quick and dirty check on *any* pad with the same technique. Terminate
>one end of the pad with 50 ohms. Use your DVM to measure the resistance on
>the other end. It should be 50 ohms. Reverse the pad and repeat the
>procedure. Pads tend to die a lot more often from RF or DC overload. The

>thing that usually goes is the part would be a resistor to ground in a PI pad.
>
>If you want to go whole hog on your new pad you can put a *small* DC
>voltage on the input and check the DC on the output. The key issue here is
>keeping the DC low enough that you don't blow up the pad. Depending on
>your voltmeter you can check pads up into the 30 db range this way. Past
>that an AC signal and an AC voltmeter probably are a better idea.
>
>Both of these techniques depend on the fact that the DC and RF performance
>of the pads are nearly identical. This is normally a good bet at R390
>frequencies. It may not be as good a bet at microwaves. I have certainly
>seen a number of dummy loads that are AC coupled. I have not seen any wide
>band attenuators that are AC blocked though. Bob Camp

Date: Sat, 9 Jul 2005 12:24:07 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: [R-390] R-390A test equipment

Had to relate this to a R-390 or R-390A somehow. Has anyone on the list recapped an URM-25D?? Did you test any of the old caps to be able to recommend which ones are most prone to fail? I have an URM-25D to align my R-390A and its starting to act a little strange after warming up.

Did take the time to test the caps in the power supply and they were fine. Although I did think it was strange the filter caps were paper and not electrolytic. Thanks for any comments and or suggestions.

Date: Sat, 9 Jul 2005 13:45:59 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] R-390A test equipment

Yeah, the rectangular caps on the printed circuit board should all be suspect, especially if they are covered with goo.

Date: Sat, 9 Jul 2005 23:34:56 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R-390A test equipment

Have you taken the time to check all the tubes? Since day one those fire bottles have been problem one that has keep many a tech busy. Then check those caps.

The power draw on the URM 25 is not big and the paper caps were good enough. Space in that box is tight and may have been a reason for the paper.

Test equipment bounced around from bench to bench. The paper caps may have offered a higher "G" force rating and been considered less likely to "fall apart"

Date: Fri, 19 Aug 2005 08:57:50 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Hollow State News

>Here's Ralph's current email address:
>r.sanserino@worldnet.att.net
>Contact him for available reprints.

While you are at it, find out if Ralph can still supply copies of: "URM-25D Overhaul Notes" by Dallas Lankford 11-88, revised. 1-94, with copy of HSN Supplement from Issue 41 about the "Terminal Board". (The Overhaul Notes themselves did not appear in HSN, only a notice that they were available separately.. There are about 18 pages if I remember correctly. Dallas has not made a similar set of notes for the -F model, unfortunately.) The original cost of these notes was VERY modest, and no URM-25D owner should be without one.

Additional articles about the URM-25 are:

HSN Issue 34 Winter 1994-95. Short Subjects: "Balky Modulation Oscillator in the URM-25, by Allan Douglas (about the R-C "T network" and padding a capacitor to make it work again.)

HSN Issue 41, Spring 1997
- URM-25D Rebuild Notes Supplement (a drawing of the Terminal Board, Courtesy of Ray Mote) this issue also includes:
- Captain Lee's Product Detector for the R-390/R-390A - Revisited - Part 2

- "SSB Adapter" - Revisited (see HSN #10 for Lankfords initial report): bridge rectifier and 6Uf capacitor only found inside.

Date: Mon, 14 Nov 2005 13:57:05 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R390A/URM25 (*)

>Could anyone please let me know the differences between the URM-25D and
> URM-25E Signal Generator models? Anything significant?

Robert, I am not all that sure, but I think that the E model was a different contract and the basic signal generator was very similar if not the same. The F model, however, IS different. It uses the same basic circuit, but the mechanical arrangements and construction are different.

Date: Mon, 14 Nov 2005 18:57:27 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R390A/URM25 (*)

Not really both are good RF signal generators. The band switch drum is different. You cannot mix and match D and E mechanical parts. Tubes are tubes and caps are caps you can repair either if they ever need it. Accept what you can get. Do not pay a lot more for a "new" E than an older "D". Roger KC6TRU

Date: Mon, 14 Nov 2005 19:13:23 EST
From: Bonddaleena@aol.com
Subject: Re: [R-390] R390A/URM25 (*)

Expect to recap it. My D model had several large micas cracked and leaking oil all over the inside. All that heat and nowhere to go. I made a ss replacement for the rectifier and it runs a lot cooler..... ron

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Date: Fri, 13 Jan 2006 12:52:56 -0600
From: "Brad Huff" <huffb@avalon.net>
Subject: [R-390] signal generators

I have seen a few comments about the URM-25 vs the HP 606A, and we all know that the HP 8640B is far superior to these. What is the general feeling about the Boonton 103B? In today's world of cheaper surplus test equipment, is it of any value to own a URM-25? -Brad

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Date: Fri, 13 Jan 2006 13:18:21 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] signal generators

I had a URM-25 after having used many different signal generators professionally and found it clunky to operate and a bit confusing. Those that were raised on them will probably disagree but that's OK....it's a personal thing. I gave it to my brother and bought an HP-606A. It's big and heavy but it's rock solid and very

straight forward to operate. It was shipped to the east coast from the west coast by UPS and was dead on when it got here.... I have no experience with the Boonton 103B. I have used a Boonton VHF/UHF generator before when doing commercial 2-way work and it worked OK. There is a 103D on auction right now for less than $100. I'm still like the HP stuff and a good 606 can be bought for no more than $100 most of the time.

Date: Fri, 13 Jan 2006 14:18:36 EST
From: DJED1@aol.com
Subject: Re: [R-390] signal generators

I don't think the URM-25 the best choice these days given the availability of quality test gear. I finally traded up because I realized that I was trying to do testing with a piece of gear almost as old as I am! However, I keep it around because it's one of the few generators that will go to 50 KHz to align boatanchors with a 50 KHz IF.

Date: Fri, 13 Jan 2006 11:25:58 -0800
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: RE: [R-390] signal generators

Both the URM-25D and a HP8640B are on my test/repair bench. Got my 25D for 50 bucks last year, it gets the job done! Only thing it lacks is a frequency counter, most shacks have one on hand. One afternoon the 25D was recapped and a shorted tube replaced, its ready for another 40 years. The HP8640B has more whistle n' bells, built in freq counter and lock are nice. You are going to pay much more for one and I'll bet you a soda it isn't working 100%. Parts can be still found by searching for someone with a hanger queen, or you can buy several to keep on hand for solid state break-downs. So if it's just for keeping one old boatanchor R390 or R390/A working like a wonderful receiver, a URM-25D will do. Got more stuff in the shack, some FM receivers, etc., could be time to upgrade. I bought the HP just for something to fix during the rainy season in Oregon. Still fix'n and the rains haven't stopped.

Date: Sun, 15 Jan 2006 10:34:54 -0800
From: "Ed Zeranski" <ezeran@ezeran.cnc.net>
Subject: RE: [R-390] signal generators

My URM-25F is still here in the line-up because its portable. I lucked out a few years ago finding a pile of HP-606A/B generators for $5 each in San Diego, kept one, and use it along with an HP-608D. It is a pleasure to use. Last year a Measurements 65B turned up and though old it looks to be a good unit butI have not had a chance to go through it yet. For audio the old HP-200A and CD models are still hangin' in there.

Date: Sun, 15 Jan 2006 13:58:10 -0500

From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] signal generators

I have a URM-25D and a HP-606B. The 25D takes up less bench space but the 606B is easier to use. The delta f controls makes getting it on frequencyeasy and it is rock stable after warm up. I don't believe the 606A has an output for a frequency counter as does the 606B. With any of these you need an external frequency counter to get on frequency. The 606A/B is big, heavy, and takes up a lot of bench space.

Date: Tue, 17 Jan 2006 16:34:08 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: [R-390] Bulb NSN?

Does anyone know the NSN for the bulb in the URM-25's?

Date: Tue, 17 Jan 2006 19:55:12 -0800
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: RE: [R-390] Bulb NSN?

Looking in one of my manuals, AN3136-323, Lamp, incandescent: 3V; 190 ma; bulb T-1-1/4 clear; 35/64inch lg o/a; special screw base; C-2R tungsten filament; burn any position. This is for the dial lights. Don't know if anyone still makes this lamp. I do believe Ashley Hall, on that e-place has some.

VO-16: Lamp, neon 105-125V; 1/25W; bulb T-3, 1/4 clear; min bay s.c.; burn any position. This is for the ON lamp.

Date: Thu, 17 Aug 2006 11:31:35 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: [R-390] URM-25D SM-35 Antenna Simulator

I am going to build a SM-35 antenna simulator for my signal generator. It uses a 20 uH choke which is no longer a standard value. Will a 22 uH choke make any difference? I suppose I could put 2x10 uH in series.

Date: Sat, 19 Aug 2006 09:05:43 -0400
From: "WD9INP/4" <WD9INP@isp.com>
Subject: [URM-25D SM-35 antenna simulator

Go ahead and use it. That's a 9% variation.

Date: Mon, 28 Aug 2006 21:08:37 +0000
From: eldim@att.net
Subject: Re: [R-390] DA-121/U Dummy Antenna

If memory serves me correctly, I believe that the DA-121/U was the Dummy Load that was supplied with the military AN/URM-25, AN/URM-26 Series Signal Generators. It may have been a supplied accessory with one or both signal generators. Hard to believe that it has been over 30 years since I last used on of these. I just looked at my FEDLOG and it was still lasted as of Mar 05, with two part numbers. The DA121U and ENTRON INDUSTRIES LP, FOREST HILLS, N.Y. Part Nr. 157C4. National Stock Number 5985-00-557-5717; Last procurement shown is 12/86 at $169.58. The DA-121/U is a 50 Ohms, 0.5 Watt, 0-50Mhz Dummy Load. I recall that the URM-25 had four or five different types of attenuators and a Dummy Antenna Load in the lid. These were a small rectangular aluminum box with a cover secured by 4 screws. Each one had a BNC Input and Output Connector, with the exception of one that had a BNC Input, and a Black and a Red Wire with alligator clips for the Output. I also think that I hmay have seen these in a tubular metal configuration, but don't hold me to that. The TM, T.O. or NAVSHIPS Manual on these generators had pictures and electrical diagrams. I'll bet if you go over to BAMA you may find the info that you are looking for.

Date: Sun, 3 Sep 2006 12:55:40 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: [R-390] DA-121A/U

In regards to my recent post about what is a DA-121A/U dummy load. It is part of Electronic Maintenance Kit MK-288/URM. On the LOGSA web site there is a Department of the Army Technical Bulletin, TG SIG 319, describing the use and schematic diagrams of the items in the kit. The kit has four dummy loads and connectors for connecting the dummy loads to receivers under test.

Date: Sun, 3 Sep 2006 13:07:40 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: [R-390] DA-121A/U Error in Post

The correct number of the publication for Electronic Equipment Maintenance Kit MK-288/URM is TB SIG 319, not TG SIG 319 as I put in my post.

Date: Tue, 28 Nov 2006 17:02:03 -0600
From: Tom Norris
Subject: [R-390] Differences between the various URM-25 generators?

I've seen the "F" model with the flat panel, and I have a Trad SG-25 with a brushed metal front but otherwise appears to be identical to the "B". The one manual I downloaded from LOGSA ages ago "says" it's for the URM-25B, but the unit in the manual bears little resemblance other than general circuit description. What other variations were there?

Date: Tue, 28 Nov 2006 17:22:15 -0600
From: Tom Norris
Subject: [R-390] Differences between the various URM-25 generators?

Typo - the generator I have looks like a "D" not a "B" OOPS
I've forgotten my alphabet quite a bit recently....

Date: Tue, 28 Nov 2006 21:41:00 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Differences between the various URM-25 generators?

I hope you get a nice long response to your question with more knowledge than I have. There were A, B, C, D, E, F, and a G. There was also a civilian model. There were many other flavors. We should have a link to a schematic for each model on your R390 pages. Maybe they should be an add on to the Y2K CD. The tube set did vary from model to model. The internal drum / tuning section / mechanical vary from model to model. The later models are considered "better" than early models. The best change is to solid state the rectifier tubes like we do with the R390's. This of course changes the B+ and frequency. So you need to re calibrate. This change does get a heat generator out of the case and lets the unit run cooler.

The D models are considered Good.

No problem keeping any of them running. Check the tubes every 4000 hours and calibrate whenever the signal gets so far off the dial number you cannot stand it any more. replace the dial lights as needed. Watch for the blue gas glow in the tubes. The tubes will still test good in a tube checker. But get them out of the signal generator. New tubes will drift. Just leave the generator on for several days to "cook the new off". Microphonic and noisy tubes are my worst problems. You can hear the generator noise in the receiver headphones when you bump the generator around on the bench. This noise is not a problem. Roger AI4NI

Date: Tue, 28 Nov 2006 23:38:31 -0500
From: Mark Huss
Subject: Re: [R-390] Differences between the various URM-25 generators?

We taught that unlike most military equipment, AN/URM-25x stands for

AN=Army-Navy
U=General Utility
R= Radio
M = Maintenance and Test Assembly
25 = non-specific RF Generator
x = which brand generator.

Which is about all that makes sense. All joking aside, the URM-25 is from a short period where someone in Procurement decided to make nomenclature a function of specification rather than a specific design. You used to see a few items running around like that. But the URM-25 took it to a whole new level. Most of the models are completely different both electricly and mechanically. You would think you were looking at completely different generators, rather than minor changes in the design. If the same criteria existed today, the M-1 Tank would be known as the M-48C.

P.S. I have a sweet mint AN/BBB-3A for sale (Army-Navy Underwater Pigeon Bomber #3A [the A stands for substituting a Duck for the Pigeon])

Date: Fri, 1 Dec 2006 13:04:09 -0800
From: "Craig C. Heaton"
Subject: RE: [R-390] Differences between the various URM-25 generators?

I've been meaning to reply for the past couple of days. As Roger, AI4NI, has mentioned, there were many flavors. When I purchased my R-390/A, a URM-25D with manuals came with the deal. First glance the identification plate on the front panel give the typical information, SG***** what ever; AN/URM-25D. The plate on the cabinet gives more information; URM-25G. Both list the same serial number!

And to add to the confusion; reading the manuals there is mention of a Oscillator Filament Regulator Assembly (AN/URM-25H only). My 25D has this board, so at some point it has been upgraded to the H version. This board is connected to the filament of V101 (6AH6).

So, maybe someone working in one of the repair depots at this time periodcould give a little insight. More info: Beg, borrow, or steal a copy of Dallas Lankford's notes on recapping the URM-25D. While looking at a scope connected to my 25D the modulated waveform left room for improvement. the top of the waveform was fine, bottom of the waveform wasn't modulated the same (less) and distorted. After recapping life was good. Well worth the money spent and I think this sig-gen is ready for another 50 years, can't say the same about my HP 8640B.

Date: Fri, 1 Dec 2006 17:44:04 -0500

From: "Larry (KW4A)"
Subject: [R-390] Lankford's notes

Anyone interested in a copy of Lankford's notes on the URM-25D contact me off list
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Date: Fri, 01 Dec 2006 17:23:25 -0800
From: "Kenneth G. Gordon"
Subject: RE: [R-390] URM-25 generators and Ashley.

I don't remember which model my AN/URM-25(*) is, but it is a good one. I think it is a late "G" model. I intend to send it over to Ashley in Washington asap to have her rebuild/restore it, since it has seen heavy use for the past 10 years or more. She has the tools, experience, and time, while although I have the experience, I sure as heck don't have the time right now. I have seen some of her work and it is really superb. Furthermore, she is a delight to talk with. I have no idea how old she is, but she is someone whose services some of us may want to use sometime. I'll try to dig out her e-mail address, mailing address and telephone number and will post them here later this evening after I get home from work.

Date: Sat, 09 Jun 2007 16:18:20 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] WTD - AN/URM-25

Subject says it! Want to get one at a reasonable price. Fair Radio has hit $200.

Date: Sat, 9 Jun 2007 17:02:25 -0400
From: "AI2Q" <ai2q@adelphia.net>
Subject: Re: [R-390] WTD - AN/URM-25

Got mine at a hamfest for $25.

Date: Sat, 9 Jun 2007 22:01:26 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] WTD - AN/URM-25

There is nothing magic about a URM-25.

It's just what the military stocked for the job. Any of the HP lab generators, that cover the frequency range, will do an equally good job on an R-390. I have seen them show up cheap from time to time.

Date: Sun, 10 Jun 2007 06:33:40 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] WTD - AN/URM-25

I know what you mean. I have a very nice HP-606B that I picked up at a hamfest for $35. The only thing I can find wrong with it is the frequency calibration is off. Since I connect my frequency counter to the uncalibrated output anyway, I have not bothered to fix that. Maybe one of these days when the bench is completely clear and I have no other projects, I will do something about it.

Date: Sun, 10 Jun 2007 12:31:35 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] attenuator IG-57A - and - Signal Generator purchased

I located the attenuator - It is being sent.
I purchased a Signal Generator.
All problems solved!
Now to clear backlog of repairs when THEY get here!

Date: Sun, 10 Jun 2007 13:07:12 -0500
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] WTD - AN/URM-25

I do the same thing with my GR1001A and its 2V output.

Handy, especially when the output voltages on the generator aren't quite enough to drive the counter.

For the most part, I'm simply rocking the dial for maximum gain, but sometimes I do want to know closely where that frequency is.

Date: Sun, 10 Jun 2007 14:27:09 EDT
From: DJED1@aol.com
Subject: Re: [R-390] WTD - AN/URM-25

I see them sometimes at flea markets, but you take your chances on whether they work or not. I haven't priced them, because I already have a Fair unit I bought for $175. However, I took a look at it a year ago and wondered why I was struggling with a 50 year old piece of test equipment that was hard to set to frequency and drifted quite a bit. So I did a little searching on eBay and bought a HP8660A for $300. Wow- what a difference in functionality. I got it with a 0.01 to 110 MHz plug-in. So now I can use the thumbwheel switch to set the frequency to the nearest 1 Hz, and know it will stay there. And, of course, its got a nice HP attenuator to set the signal level down to .01 microvolts. It makes it easy to check

the PTO- just dial up the frequency in 25.000 KHz steps and see what the dial reads. There are a couple of drawbacks: it's heavy, so it costs a lot to ship, and it's a lot more complicated to maintain if something breaks. But, if you want to be authentic to the '50s era, then the URM-25 is the way to go.

Date: Sun, 10 Jun 2007 13:47:20 -0700
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>
Subject: RE: [R-390] WTD - AN/URM-25

The AN/URM-25 is a pretty good OLD unit, but there are better, more useable signal generators which do a far better job. I don't like their drift at the higher frequencies, and you must use a frequency counter with them in order to really know where you are. If you really want an AN/URM-25, get hold of Ashley (?) in Oregon who completely rebuilds them for, IMHO, peanuts. She does a superb job, and often times has rebuilt units for sale on "the bay". Do a search for URM-25 to see what pops up.

Personally, I would prefer to use practically any of the more modern units which cover the required frequency ranges. The HP-8640B WAS an excellent choice, but since those used nylon gears, many of those units are becoming unusuable since the gears are gradually "going away" and there are no replacements. I have an HP-8640B which I use a lot, but I am very apprehensive that a gear will fail, and I will be in the market for a replacement.

I also use a pair of BC-221s when I am aligning receivers for band end-points, one set at the high end and one at the low end. The BC-221 is more difficult to set on frequency, but it is very stable and when properly calibrated, plenty accurate enough frequency-wise. They are also cheap, if you buy them properly. One of those I bought cost me $10.00 and the other one $5.00. The $10.00 one had an AC
power supply in it.

Date: Mon, 22 Oct 2007 03:00:56 -0400
From: "Richard Spargur" <k3ui@comcast.net>
Subject: [R-390] AN/URM-25J

I have an AN/URM-25J on loan from a friend to use to restore a few R-390As I have. I am familiar with the AN/URM-25C, D and F models from military service starting in 1969. Does anyone have a manual or some documentation
that shows what an AN/URM-25J is?

Date: Mon, 22 Oct 2007 03:04:33 -0400
From: "Richard Spargur" <k3ui@comcast.net>
Subject: [R-390] RE: AN/URM-25( )

Does anyone have an electronic copy of the manual(s) for the AN/URM-25D, F

and J models?

Date: Mon, 22 Oct 2007 11:43:49 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] AN/URM-25J

It is a URM-25D, apparently. (But, Les notes that it has more attenuation stages.)

Does yours:
- have a label on the front panel that says URM-25J?
- have more than normal positions on the RF output attenuator?

I found some emails in my notes about this some time ago:

>>Speaking of signal generators, how does the URM-25J
>>stack up against the others mentioned?
>
> My guess is: about the same.
>>Is it substantially better than the "D" model? Just what are the differences?
>Can't tell you, but my notes on the URM-25 include the following messages.
>I assume that "more attenuation stages" means an additional step in the
>output attenuator. I do not have pictures with enough clarity to see if this is true or not.
>
>>I just bought a URM-25 generator from Fair Radio (checked unit). It looks
>>complete with all the adapters manual etc. When I was looking for one they
>>disappeared off the Web and epay. My unit has 2 different tags on it the
>>front panel has a URM-25D (with new screws) and the case has a URM-25J
>>(1968?) Is there anyway of knowing which one I have and what version is a
>>URM-25J?

>>The tag is attached to the front panel.
>>The front panel is attached to the guts.
>>That is what makes the model.
>>The case is just there to keep the dust out.
>>
>>Ok so some one droped a D model into a J case.
>>Ah the wonders of interchangeable parts.
>>The J version is the 9th or 10th version.

>>
>><< I thought the URM-25J was a URM-25D with a different accessory or
>>two. At least that was what I read on one of these lists awhile back.
>>
>>And, more attenuation stages in it.

Date: Mon, 22 Oct 2007 09:01:41 -0700
From: W6GER <w6ger@uci.net>
Subject: [R-390] RE: AN/URM-25( )

Richard, you can download manuals for the URM-25D & URM-25F from The BoatAnchor Manual Archive (BAMA) at: http://bama.sbc.edu/military.htm
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Date: Mon, 22 Oct 2007 13:43:55 -0400
From: "Bob Young" <youngbob53@msn.com>
Subject: [R-390] speaking of AN/URM's

My AN/URM-25F has always has severe backlash since I bought it, I took it apart and found an adjustment that should have taken care of it, (it presses the worm gear against the round gear driving the variable cap). It was not even touching so I adjusted it down a little bit, put it back together and I have no RF output now, all tubes are good, I can't see where I did any damage, the modulation still works. Worst of all a little set screw fell out of it or it was a huge coincidence and I can't figure out where this came from. Anyone have any ideas or does anyone know a place where I can get this reconditioned?

Date: Mon, 22 Oct 2007 14:26:05 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] speaking of AN/URM's

AH! The dreaded worm gear.. heheh NOTE: the D and F model have different drive mechanisms if I remember right. The F model is quite similar electronically to the D, but quite different mechanically. Backlash in the D model can sometimes be cured by adjusting the ONE-BALL, rear tuning shaft adjustment. This is the shaft that carries the single knob on the front panel. There is a single ball bearing at the rear end of that shaft, with a slop-adjusting mechanism. The tell tale symptom is that when you push and pull gently on the frequency set knob, the frequency changes as you do. Use CW mode on your receiver. I suggest hat when adjusting this thing, you get the thing plenty warmed up before you take it out of the case. Mechanical play may change when it's hot.

There may also be a spring or adjustment that adjusts the mesh between the worm gear on that shaft and the main tuning large gear. This seems to be what you found in your F model. The large gear MAY be of the spring loaded anti-backlash type. (I can't remember). These would be two different situations.The F model has a different shaft arrangement on the tuning knob, but I can't remember the details.

I have a D model that needs to be taken apart for attenuator repair..someone smoked it on one position. I have another URM-25 handy, but I'm not sure if it is an F. Does anyone know if the attenuators can be swapped?

> It was not even touching so I adjusted it down a little bit, put it back
> together and I have no RF output now,

Uh oh. Something went awry. Do the tuning cap plates now rub? Was the adjustment on the tuning knob shaft or on the main capacitor gear shaft? Maybe you lost a ball bearing and the cap rotor and stator are now rubbing.

>...The modulation still works.

For now. The D model is susceptible to modulator failure. The cause is drifted resistors and/or leaky capacitors (paper most likely) in the bridged-Tee circuit in the oscillator. Dallas Lankford wrote a multi-page description of how to overhaul the D model while he was editing Hollow State News. The HSN publisher can still supply a paper copy of that. I think also that it has been transformed into digital form but I'm not sure of it's availability. No owner of a URM 25D should be without one. (He does not deal with the tuning mechanicals. Also, he did not write a similar one for the F model.)

>Worst of all a little set screw fell out of it or it was a huge
>coincidence and I can't figure out where this came from. Anyone have any
>ideas or does anyone know a place where I can get this reconditioned?

Do you have the errant set screw? If you report the size of the thing, it may help locate the place it belongs. It may well be left over from years ago and there really is no missing set screw. There has been one person who worked on these things and has sold refurbished ones on ebay or mailing lists. Can't remember who. That may be in my notes file.

Date: Mon, 22 Oct 2007 12:02:41 -0700
From: "Brian Bjerkelund" <k7ais@msn.com>
Subject: Re: [R-390] speaking of AN/URM's

Roy and group: That would be cornelius_connie (ebay id). I have no connection or knowledge on this outfit.

Date: Mon, 22 Oct 2007 12:13:36 -0700
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>
Subject: Re: [R-390] speaking of AN/URM's

Yes. That is the one. Connie is very capable, honest, and thorough. She routinely sells URM-25s and other like items on the bay sometimes. I have heard nothing bad about her at all from any source.

Date: Thu, 6 Nov 2008 19:08:24 -0800 (PST)
From: David Elsea <dkelsea@sbcglobal.net>
Subject: [R-390] sg-103

Is the SG-103/URM-25F the same thing as the AN/URM-25F. They look the same. Can't seem to find anything on the SG-103, however it brings alot of an/urm25f hits on google. Just wondering. Dave

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Date: Thu, 6 Nov 2008 22:29:18 -0600
From: Tom Norris <nu4g.radio@gmail.com>
Subject: Re: [R-390] sg-103

Yep, best as I can tell. I have an SG-1 which was "navalized" by painting it gray (over a flawless silver/gray hammertone, dangit!) and stenciling URM-25 on the back and sides. The front is brushed chrome and hard to read, but is calibrated perfectly. It was the civvied-up version of the URM-25 by the same contractor that was on the Navy tag. (whom I forget) By bet is you'll be hard-pressed to find any differences in yours and an "official" URM-25, other than possibly two tags.

Date: Sun, 15 Feb 2009 11:28:40 +1100
From: "Pete Williams" <jupete@bigpond.net.au>
Subject: [R-390] Test Equipment

G'day.... well, for goodness sakes guys... belittling a URM-25,56+years old, because it doesn't do alinement/tests or whatever to current standards pays no respect to history.--Vintage. Used for R-390's it's perfectly satisfactory-why, you can align a R-390 using the calibrator if you read the manual and have your druthers about you. Any noticeable/useable improvement using later sophisticated gear is fetishism to extreme lengths ---- get real !

Date: Sun, 15 Feb 2009 12:22:01 -0500
From: Bob Young <youngbob53@msn.com>
Subject: [R-390] backlash on URM-25

My URM-25 bought from a vendor who sells them on epay, it came with some back lash and it has gotten worse, I have tried the fix (making the gears tighter with the adjustment) and it helps but there is a point of diminishing returns where it gets so hard to turn that it is useless.

I even sent it back once (after shorting out something from my "fix" and got congtatulated on my "fix" or in other words don't send it back to us, haha! This is the only flaw I've found, the backlash is terrible on high frequencies, so I guess I will be looking for a better frequency generator or another one without backlash,

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Date: Sun, 15 Feb 2009 15:48:08 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] backlash on URM-25

You may be going the wrong way with your back lash. My recollection from the late 60's early 70's was the generators always had some back lash. You just could not roll up on a frequency and then expect to just back up as you over dialed. You had to have a feel for each generator. You rolled up to where you wanted and watched the meters and dial. You made two three passes at it and then tried a time or two to roll on the spot you wanted without going over. If you went over then you dialed way off and rolled up again. you had to decide if you wanted to roll up or down to get the frequency.

But you likely have excess friction in yours that keeps you from getting it where you want. When you let go of the knob it wants to change frequency and you have trouble getting it to stick as you let go of the knob.

The mobile synthetic motor oil for a lube is in order. You may have to pull lots of the mechanism apart and clean and lube every thing. You may have to scrape a shaft and file a couple burs to get the guts smooth again. You may have a bend in a shaft that is binding from years of shipping and moving. The drum should drop firmly on the detents. But as you dial the frequency the knob should be easy to turn and smooth. Getting the mechanical motion of the generator silky is a lot like getting the KC change in the receiver to run nice and free. Some lash adjustment is needed but mostly just to take the slop out of the mechanism. Much like not over doing the springs in the split gears of the receivers. Hope this gives you some help getting the mechanical adjustments in better condition.

Roger AI4NI

Date: Sun, 15 Feb 2009 16:54:03 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] test equipment question

Yup..I used the URM25 and it did do the job. But is wasn't real easy because of it's accuracy. Had to use a frequency counter to make sure it was on frequency

and wasn't drifting. I currently use the HP-410c....love it....and the 505 is a great analog meter. My biggest gripe was the signal generator.

I moved up to the 8640B because it had digital display but don't let that fool you. It's a boatanchor too. Probably was current issue in the early 70s if I had to guess so it's nearly 30 years old.. It's not a synthesized modern marvel. I set the range switch....dial up the needed frequency on the display and push the lock button which does a PLL type function to hold it exactly on the frequency desired...if it drifts out of lock range the display flashes. Release the lock, reset the frequency and relock. Works much easier and presents a 50 ohm load. I work on modern gear as well so it was needed for that too. What you have is all one really needs to do the work on the R-390 series and I don't think anybody is trying to sell you on something else. But if you ever decide to upgrade you know what's out there to go to...

I also have an HP 606A which I like using as well... It's a necessity on the 50KC IF's....

Date: Sun, 15 Feb 2009 21:05:45 -0500
From: frankshughes@aim.com
Subject: [R-390] HP 8640b

I really wanted an HP 8640b, but when I Googled, I found so many folks trying to find repair parts w/o any luck that I went w/ the old, trusty/rusty URM-25. Particularly interesting was one guy who claimed to have bought 4 broken HP 8640b's and his humorous report about trying to get one working unit from the piles'o parts. As previously mentioned, when left to warm-up and stabilize, my URM-25 holds frequency well. The only thing that was wrong w/ it out-of-the-box from Fair Radio was no signal in two bands. There is so much documentation on how to troubleshoot & repair the URM-25 that I suspect mine will have the missing bands restored in short order.

Date: Sun, 15 Feb 2009 21:19:21 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] backlash on URM-25

If yours is a D model (not an F) then the fix may be easy. The frequency knob is on a shaft that goes all the way to the back of the oscillator compartment casting.

There, at the rear, is a single ball bearing and end play adjustment assembly. The assembly consists of a threaded bearing seat, the bearing, and a lock nut. (Note: I just looked at the digital copies of the manual I have here and I cannot: a) see where the end of that shaft is in the picture b) see whether the shaft goes to the rear cover of the casting, or if the bearing is inside so that you can see it only once you get the rear cover off.)

If the end play is more than it should be, the knob will have backlash as you turn it to adjust the frequency. The simple test for this is to push and pull on the frequency set knob while listening to the generator with a receiver set for CW. The note should not vary much at all (especially on the lower frequencies), and when you let loose of the knob, the note should return pretty much to what it was. If the beat note disappears altogether, or varies a lot, your shaft has end play. My notes include an email from a fellow who found a tension device that holds the worm gear part of that shaft in mesh with the gear that's on the tuning cap shaft. He solved backlash apparently by adjusting that tension.. It's not clear that we are talking about the same thing or not. I do know that the F model has a different drive shaft mechanical arrangement. I would expect to see grease at the worm and main gear. To fix this, run the generator out of its case till it's plenty warm. This makes sure your adjustments will not be thrown off due to warm up. (If you care to, clean and re-lube the whole frequency set mechanism first.) Then loosen the lock nut and turn the inner bearing seat in a bit, and tighten the nut. You'll have to learn how to preload the adjustment, or allow for the effect of the lock nut tension after you make a change. You should arrive at a point where the shaft has no perceptable end play, and runs free, both. If there's a separate adjustment that sets the depth of engagement of the orm gear in the main tuning gear (that is phenolic, I think), then set that for little or no backlash. If I remember correctly the main phenolic gear is not spring loaded for anti-backlash.
While you are in there, apply a drop (only) of Caig De-Oxit to the tuning cap grounding wipers, and just a touch of oil at what I assume are ball bearings on the shaft. Do report what you find. My memory of all this is some years old now. If you run into trouble or some mystery, I may be able to dig out a URM-25 here and have a look at the thing to report more clearly what's there.

Date: Sat, 18 Jul 2009 12:02:11 -0700 (PDT)
From: stoth47@yahoo.com
Subject: [R-390] URM/25D dial lamps

Anybody happen to know a 10 ea. qty source for the URM/25D #325 dial lamps? - I need two new ones.? I searched the usual suspects and found the lamps at Digi-Key, but they are a non-stock item with a 100 piece minimum at $.80 a pop. I have sent a query to Ashley at Kiss Electronics.? If I get a response, I'll let the group know what she comes back with.

Date: Sat, 18 Jul 2009 15:09:07 -0400
From: Physicist <physicist@cox.net>

Subject: Re: [R-390] URM/25D dial lamps

Newark Electronics? Future Electronics?

Date: Sat, 18 Jul 2009 16:06:53 -0400 (EDT)
From: larrys@teamlarry.com (Larry Snyder)
Subject: Re: [R-390] URM/25D dial lamps

These look to be pretty dear. Try http://shorterlink.org/5607

Date: Sat, 18 Jul 2009 16:11:24 -0500
From: Dave Merrill <r390a.urr@gmail.com>
Subject: Re: [R-390] URM/25D dial lamps

The correct number is 323 and here is one source:

http://www.bulbman.com/index.php?main_page=product_bulb_info&products_id=15763 About $4 ea plus shipping
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Date: Sat, 18 Jul 2009 22:56:46 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] URM/25D dial lamps

These lamps have long been either hard to find or pricey. I remember prices in the past being much higher than the $4 from the above source. The URM- 25 *D* uses four of them. The F model used different lamps altogether. If you relamp your D, I suggest you masure the actual lamp voltage and consider increasing the dropping resistor value to extend the life. Some fellows in the past have changed the lamp type altogether to use a lamp more affordable and findable, and incidentally increase the amount of light that gets to the dial!

Date: Sat, 18 Jul 2009 20:29:23 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: Re: [R-390] URM/25D dial lamps

I've already sent this information to Steve about the CM323 bulbs for the URM-25D. The best price in town so far is jkllamps.com; minimum order of 10 @ $1.50 ea plus shipping. My 25D takes 2 of these 323's for the dial and one NE-51 for the ON indicator. The 323 number I believe is a Chicago Miniature #.

Date: Sun, 19 Jul 2009 07:34:25 -0700 (PDT)
From: stoth47@yahoo.com
Subject: Re: [R-390] URM/25D dial lamps

Thanks Craig for the URL on getting the lamps! Also thanks Dave for contacting me and pointing out the correct Chicago lamp number. Here's the (condensed) response from Ashley at Kiss Electronics: "We rework the lamp circuit to use modern wire lead lamps, Jameco PN 41065 (or whatever the current part number is)."

Date: Sun, 19 Jul 2009 18:06:22 -0400
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: [R-390] 323 Bulb

Radio Shack used to sell a sub-miniature 6 volt bulb with screw base. I took a piece of number 20 solid hook-up wire, bent it around the base at the end, soldered and created my own flange. Some are still in my Collins 75AI receiver. Should work on the 25D.

Date: Wed, 30 Sep 2009 23:20:42 -0800
From: "Scott" <scott@becklawfirm.com>
Subject: [R-390] RURM-25D

Where can I download at least the operation section of a manual on the URM-25D Signal Generator

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Date: Thu, 1 Oct 2009 07:14:02 -0500
From: Dave Merrill <r390a.urr@gmail.com>
Subject: Re: [R-390] RURM-25D

You can find PDF copies of the original manuals for the URM-25 series at:
http://bama.edebris.com/manuals/military/urm25/
NAVSHIPS 0967-187-5010.pdf is probably what you need.

Date: Thu, 24 Feb 2011 00:07:25 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Non-A alignment question

See if the IF strip is working (inject 455 kc in to the in put of the IF strip from the URM). Then see what frequency the PTO is really on: use another receiver with a bit of wire as antenna stuck down into the PTO oscillator tube shield, A bit of manual study will reveal what the PTO frequency should be.

Later, come to understand the mixing scheme and the frequencies expected at different parts of the radio.. Locate the test points on the RF module and inject signals expected, starting nearest the IF output.

NOTE: If you are using the URM module that has a single capacitor in it, replace that thing before going very far. It may well be leaky and let B+ into your URM attenuator, or let grid voltage leak off from the radio.

Date: Wed, 23 Feb 2011 23:50:08 -0600 (CST)
From: nryan@mchsi.com
Subject: Re: [R-390] Non-A alignment question

Nice tip, Roy, and thanks for that.

I think you are referring to the CX-1363/U test lead. I dashed over to mine and checked it for leakage and it's OK. It happens to be one I made using new components in an identical housing, but it never dawned on me that vintage units should be checked for sure. The test lead can be viewed on page 2-10 of the URM-25D manual TM 11-5551-D. It's simply a blocking capacitor network comprised of a .1 mF @ 400VDC capacitor in parallel with a 510 pF @ 500VDC mica capacitor.

Vy 73 de Norman, KG4SWM

Date: Tue, 14 Jun 2011 07:16:23 +0200
From: Heinz Breuer DH2FA <dh2fa@darc.de>
Subject: Re: [R-390] USU 1

>Long time that I am looking for schematics and manual of: ROHDE
>SCHWARTZ USU 1 SELECTIV MIKROVOLTMETER ,

Hello Alex, if you can't find it anywhere else Rainer Foertig
http://www.rainer-foertig.de/unterlagen/hb.htm
has it available for EUR 48.40 which is about $70
http://www.rainer-foertig.de/unterlagen/RS-30_2010.htm
I bought a couple manuals from Rainer in the past and they are high quality xeroxed copies. No connection just a satisfied customer.
Contact Rainer at <archiv@rainer-foertig.de>
I may be able to assist you if you have any difficulties with the transaction. I am about 20 minutes drive from him.

Date: Tue, 5 Jul 2011 08:19:21 -0500
From: Ben Loper <brloper@gmail.com>
Subject: [R-390] TV-7 lid gasket

Does anyone know where I can find the rubber gasket material for a TV-7

tube tester lid. I saw it before and have checked several websites but I can find it. The orginal gasket is about 1/4 wide and has a "V" shaped groove.

Date: Tue, 5 Jul 2011 19:51:12 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] TV-7 lid gasket

I think it's called welting. I've not tried this on a TV-7, but you might want to check out the aftermarket stuff used to protect car door edges. I found some at WalMart that works fine on my car. My material came in strips -- I think you may need two of them to go around a TV-7's lid. Have a look in a Super Store automotive section or an automotive store and check if this might work for you. Best of luck, and let us know what you find.

Date: Wed, 6 Jul 2011 23:52:31 -0600
From: Transmaster <22hornet@gmail.com>
Subject: Re: [R-390] TV-7 lid gasket

I was going to suggest you go to a good NAPA Auto parts store they sell all kinds of this type of door and window seal material by the foot.

Date: Thu, 7 Jul 2011 12:47:53 -0500
From: Dave Faria <Dave_Faria@hotmail.com>
Subject: [R-390] TV-10 Lid Gasket

If all else fails use some cold weather pipe wrap. Home Depot sells it in 20ft rolls for maybe $5. It is a tough foam rubber and sticky on one side. The rubber is abt 1/8in thick and 1.5 to 1.75 inches wide. Easily cut with a pair of scissors.

Date: Thu, 7 Jul 2011 20:05:01 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] TV-10 Lid Gasket

Would this type of gasket material work?

http://www.tubesandmore.com/scripts/foxweb.dll/moreinfo@d:/dfs/elevclients/cemirror/ELEVATOR.FXP?item=P-D280

Date: Thu, 7 Jul 2011 20:11:36 -0400

From: Barry <n4buq@knology.net>
Subject: Re: [R-390] TV-10 Lid Gasket

Also, have you checked McMaster (www.mcmaster.com) for "rubber gasket"? They have lots of different forms.

Date: Thu, 7 Jul 2011 18:56:48 -0700
From: "Foster" <Fosterp@pahrump.com>
Subject: Re: [R-390] TV-10 Lid Gasket

Has anyone asked the TV-7 GURU (Dan Nelson) about the gasket materiel for the TV-7 series cover? He was advertising in Electric Radio 73//Foster W4HCX

Date: Thu, 7 Jul 2011 21:16:43 -0700
From: "Foster" <Fosterp@pahrump.com>
Subject: [R-390] FW: TV-10 Lid Gasket

Following received from the TV-7 man...Hope this helps

-----Original Message-----
From: Daniel Nelson [mailto:djn@ieee.org]
Sent: Thursday, July 07, 2011 8:43 PM
To: 'Foster'
Subject: RE: [R-390] TV-10 Lid Gasket

I do not have any original gaskets. I make them up with a 1/4" half round gasket I get from a local Auto supply store....Hope this helps...

Regards,

Daniel Nelson
djn@ieee.org

Date: Wed, 7 Dec 2011 11:29:13 -0800 (PST)
From: John Flood <kb1fqg@yahoo.com>
Subject: [R-390] TV-7 meter needed

Ok when you all stop laughing, I do need one. My movement is hanging up. I got it working better than it was but I'll be needing a replacement. I see them from time to time on epay but wanted to check here first. <snip>

Date: Thu, 08 Dec 2011 07:36:57 -0600
From: Jerry K <w5kp@hughes.net>
Subject: Re: [R-390] TV-7 meter needed

John, check this <http://www.gvtc.com/%7Eedengel/TV7Meter.htm> out for a slick idea for replacing the TV-7 meter. I plan to try this if mine bites the bullet.

(hacking a DMM for use in a TV-7D… ed.)

Date: Thu, 08 Dec 2011 08:57:21 -0500
From: k2cby <k2cby@optonline.net>
Subject: [R-390] TV-7 Meter

I had a TV-7 meter problem some years ago. The cause turned out to be the little electrolytic that?s hung across the meter terminals (which had failed open). By the time I traced the problem the meter movement had gone west from oscillating back and forth and had to be replaced. I discovered that the meter is an ordinary run of the mill 50µA movement (Simpson I think). I easily found a replacement and simply swapped dials (didn?t even have to drill new holes in the dial for the mounting screws).

Date: Thu, 01 Mar 2012 13:35:48 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] HP-410Bs and AN/URM-25s

Ashley Hall, HMIC, (Head Mother In Charge), <Kiss-Electronics.com>, no longer refurbs or supports the AN/URM-25s. However, She provided me with a parts list for what the used to do. She also provided me *Their* procedure for refurbishing. I can provide this to any and all that desire this. (If enough want this info, I'll put it on my site for download.) She and her crew are providing the equivalent services for HP-410s.

I recently procured a DC probe for mine. My HP-410B is a peculiar one. My probes are NOT soldered in under the chin. Either a previous owner built a beautiful aluminum piece with banana jacks for ohms and common, and 1/4" Phone jacks for the DC and AC probes, OR it is a prototype. I don't know which, but it was done in a very professional manner.

It makes thing a lot neater on the bench, as when not in use, the meter can sit on a shelf, and all the probes can be hung up out of the way.

I've checked the HP-410B against known, 1% resistors, known DC source of 3.7VDC, and checked the AC by a known fixed voltage. The old gal is right up to snuff!

Date: Thu, 1 Mar 2012 13:51:42 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] HP-410Bs and AN/URM-25s

Any chance of posting pictures of that 410B anywhere? I'd like to see that one.

Date: Thu, 1 Mar 2012 14:08:32 -0500 (EST)
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] HP-410Bs and AN/URM-25s

I know of some folks who are buying used URM-25s to strip the tuning capacitor out of for crystal radio aficionados. The variable capacitors are very high quality with silver plated vanes and highly sought after by crystal radio builders for their high Q. One of those capacitors recently sold for $202 on Ebay.

Date: Thu, 01 Mar 2012 14:24:54 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] HP-410Bs and AN/URM-25s

This indeed went the way I felt that it would. So I am going to put it on my site for download with regard to the AN/URM-25s. All info regarding the HP-410s is available on <www.kiss-electronics.com>. Give me a chance to grab the URM-25 parts and refurbish procs, combine them into one text file and get it on my site for any and all to download. The number of requests has already gone over 8 or so. I only expect this to keep climbing.

Date: Thu, 01 Mar 2012 14:41:34 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] AN/URM-25 info

I have *JUST* uploaded the parts and procedures in one document. It may take an hour before it's available depending on Comcast's servers.
<http://home.comcast.net/~rbethman/Parts-Proc.txt>

It must be exactly as listed. The server is a case sensitive UNIX based server.
Enjoy! I am more than happy to share information! <snip>

Date: Thu, 01 Mar 2012 14:44:28 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] AN/URM-25 Manual

To get the schematics and very detailed manual(s), go to Edebris.
You want all the NAVSHIPS manuals.

Date: Thu, 1 Mar 2012 13:48:11 -0600

From: Mike Andrews <mikea@mikea.ath.cx>
Subject: Re: [R-390] HP-410Bs and AN/URM-25s

Let me again plug <http://hamstuff.ath.cx> for pictures of ham stuff: radios, test gear, etc. The price is right.

Date: Thu, 01 Mar 2012 15:05:14 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] AN/URM-25s

I'll add that some others along with myself, have experienced RF leakage on these Sig Gens. I am going to apply Scotch #24 [I just went and picked up my last boxed roll!], (Old number from back when I worked with high voltage production and distribution.), Shielding "tape". It is tinned copper wire Braid. It comes in a roll 1" wide and 15ft long. I am either going to enclose the rubber gasket within it, OR I'll simply add it as a shield between the front panel and the case. This will result in a far better RF shield. Take this advice as you decide. I've done this with Radios ever since I got licensed in 1980 whenever I felt that RF leakage may be an issue.

Date: Thu, 01 Mar 2012 15:12:08 -0500
From: Curt <cptcurt@flash.net>
Subject: Re: [R-390] AN/URM-25s

In the Army cal manual for the TM 1170 (Wavetek 3002) there is described a "test wand" used to validate the leakage level. The attenuator goes down to -138dBm.

Date: Thu, 01 Mar 2012 15:21:43 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] AN/URM-25s

This may be so. I will only explain that with my AN/URM-25D on, not connected, and about 3feet away from a closed Kenwood R-2000 with nothing connected to the SO-239, and NO cable on the AN/URM-25D, I was able to pick up carrier and S-Meter deflection. This was with the output dialed to the minimum on the Sig Gen. So the leakage is real. Both were on separate circuits, and both had a separate ground. Hence my commentary and my intent.

If I want to begin "sniffing", I have an HP-312A Frequency Selective Voltmeter. However, based on the described above observation, I'm going with the extra RF seal!

Date: Thu, 01 Mar 2012 15:42:04 -0500

From: Curt <cptcurt@flash.net>
Subject: Re: [R-390] AN/URM-25s

Yes..I don't think your observations are unique. As Trish noted, it takes a lot of effort to really seal up something at that RF level. I'm sure the braid seals will help. Former life as a Tektronix field engineer, I had the opportunity to support several well equipped Rx development labs in the area. The efforts they took to get isolation were pretty remarkable. Screen rooms, floating floors, anechoic coatings, etc. Hard to imagine anyone doing similar work without extraordinary measures.

Date: Thu, 1 Mar 2012 15:03:55 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] URM-25, RF leakage and test gear

I originally picked up a URM-25 just to use the same piece of equipment as shown in the R-390A manuals. I found it to be a fine piece of mil grade gear for getting in the ballpark (particularly when considering when it was made) but not on par with modern test equipment. I plan on letting it go fairly soon. When that happens, as always, the first option would go to folks on this list before I ever went the eBay route for someone who just wanted to tear it apart to make a cool crystal radio. When I get in the mood I will let y'all know.

Date: Thu, 1 Mar 2012 13:24:04 -0800 (PST)
From: Steve Toth <stoth47@yahoo.com>
Subject: Re: [R-390] URM-25, RF leakage and test gear

FWIW, when I aligned the HQ-129X I picked up, I used my URM25D with a frequency counter hooked in externally to the output.? Worked great.? After warm-up, the URM25D was rock solid and I was able to bring in the required freqs spot on.

Date: Thu, 01 Mar 2012 16:43:06 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] URM-25, RF leakage and test gear

I've had the same results with mine also. It simply is time to go through all the old caps and a few resistors to ensure the old gal stays up and running for an extended period of time. I plan to keep her around for quite awhile.

Even though I also have more modern equipment, the digital HP-3336B, I love the old gal! She has got a certain thing about her. I'm only making her a little bit better, and overhauled. It is sort of like keeping the HP-410B as primary, with a TS-505D/U also. Even though I have a good quality DVM on hand. Then I

also have a TEK 5440 that can read up to 25Mc, and down to less than 1mv per graduation. All things get brought to bear when necessary.

My primary reason for the HP-3336B was to use as the VFO tied to my BC-610 and/or T-213. However, it is very readily shifted in duties since I have a WECO to BNC adapter, AND a cable already built with the WECO connector on one end, and a BNC on the other. Flexibility is a great commodity. Makes challenges easier to overcome!

Date: Thu, 01 Mar 2012 19:43:19 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] AN/URM-25s

I've worked with the guys performing repairs on radar sets and the like, all the the same time the massive search radar was just above us in Western PA. It saw out into the Atlantic. We certainly didn't have all this isolation that has been described. Yet - we were able to get the MTRs, (Missile Tracking Radars), repaired and tested. Sorry, but these were antiques in the early '70s. Some of the circuit boards had discrete components such as 2N110s on one of the little boards. One of the MTRs requirements was to lock on the top 12 inches of the Nike Hercules, AND stay locked for the entire launch until intercept. So such extreme measures really aren't all that necessary to perform a high degree of adjustment and tweaking of equipment. That is a simple reality that some folks do not grasp despite their intellectual acumen. BTW - We were required to take an entire Missile battery to Ft. Sill, OK annually, and perform actual firings against drone aircraft such as T-33 and/or F-89s. So I know from experience the ability to achieve this level. Bob - N0DGN

> It can be done, but it is a challenge. I generally find that most
> hams' measurements of sensitivity at HF are optimistic by 10 dB or
> more due to signal leakage. For all of their good qualities, R390As
> are particularly egregious offenders -- they leak RF like a sieve, so
> ANY leakage from your sig gen will make them appear to have very high
> sensitivity.
>
> Note that there are two issues -- signal from the generator leaking
> out of the cabinet and into the DUT, and external QRM and QRN leaking
> into the DUT (possibly including RF that leaks into the sig gen and
> then appears at its output jack, or is induced into the cable

> connecting the sig gen to the DUT).
>
> It helps greatly to use a well-shielded external coaxial attenuator
> (e.g., HP355A + 355B, or JFW adjustable attenuators, or Mini-Circuits
> in-line attenuators), placed right at the input of the DUT, rather
> than using the internal attenuator in the sig gen. (By "right at," I
> mean connected using just a coax adapter, no cable at all -- prop the
> attenuator up on a stack of books or something so it isn't just
> hanging there.) That way, the level in the connecting cable is much
> higher and any QRM/QRN introduced before the input jack of the DUT is
> attenuated by many dB. Ideally, you would move all of the
> attenuation to the DUT end of the cable and run the sig gen at 0 dBm
> or more. If nothing else, get three or four Mini-Circuits HAT-30
> fixed attenuators (http://www.mini-circuits.com/pdfs/HAT-30+.pdf)
> ($10 each) and put them right at the input of the DUT to do 30, 60,
> 90, or 120 dB of your attenuation there, and do the rest (always less
> than 30 dB) at the sig gen.
>
> Preventing leakage into the DUT other than through the antenna jack
> can be harder (and, of course, to the extent that you reduce it, your
> results will not represent how an off-the-shelf unit works). A GOOD
> power line filter is mandatory, on both the DUT and the sig gen. Use
> copper mesh gaskets at all cabinet joints (or these days, conductive
> polymer shield gaskets). One of the greatest sources of this ingress
> (or egress, in the case of signal generators) is the chassis openings
> for controls. One thing that helps is to put mesh grounding collars
> on the shafts of rotary switches, capacitors, and potentiometers to
> ground the shafts to the cabinet (look inside the front panel of an
> HP8640B for an example). These days, you will probably have to make
> your own -- coarse stainless-steel wool works OK (do NOT use regular
> steel wool).
>
> If the input jack of the DUT is floating (not galvanically connected
> to the chassis right there at the jack), make sure the body of the
> connector is RF-grounded using a 0.01-0.1 uF capacitor (best practice
> is to use the cap in parallel with a 10-100 ohm resistor). This
> applies to any other floating connectors, as well, not just the input
> jack. You also may want to wind 10 turns or so of the cable
> connecting the sig gen to the DUT around a ferrite toroid core (Type
> 43, say 2.4" OD) to keep any QRM/QRN riding on the shield from
> getting to the DUT input. Put this choke immediately before the
> external attenuator (or the DUT input, if you are not using an
> external attenuator -- but understand that if you are putting -130
> dBm and lower signal levels into the sig gen end of the cable, you
> are unlikely to get good results no matter what else you do).
>

> If you have a chance, taks a Harris 590 apart and observe what they
> did -- the 590 is the best-RF-sealed receiver I have seen
> (interestingly, the 590As I have seen are not as good by 15-20 dB at
> some frequencies).

Date: Thu, 1 Mar 2012 18:54:19 -0600
From: <wb5uom@hughes.net>
Subject: Re: [R-390] receiver sensitivity testing

Yes I agree, sort of. If I do the standard test and can follow the 1000hz tone all the way down with my ole going deaf hearing, I think I should be able to do the same test in SSB mode with voice using my aforementioned service monitor (I will let others say if its lab grade or not- aeroflex 3920) Covers on, screws tight and a 1 foot coax from generator to antenna input, in my living room wih not much electrical on in the house

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Date: Fri, 2 Mar 2012 08:59:15 +0800
From: Francesco Ledda <frledda@att.net>
Subject: Re: [R-390] AN/URM-25s

I worked on the Nike myself as a sys engineer for an European defense contractor. Our systems were Block 3 with solid state receivers, digital angle encoders (replaced the potentiometers for az-el) and a norden pdp-11 dig ballistic computer (replaced the 2 cabinets of the analog mech computer). The reliability of the block 3 system was very good.... No need to balance those vacuum tube op-amps! It was fun...

Date: Thu, 1 Mar 2012 19:07:59 -0600 (CST)
From: nryan@mchsi.com
Subject: Re: [R-390] AN/URM-25s

DUT = device under test

Date: Thu, 1 Mar 2012 21:37:53 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] AN/URM-25s

> -- they leak RF like a sieve, ……

I don't understand how the radio leaking RF determines whether a leaking generator will get into the radio. I understand that a leaking generator can get into the radio but don't see what the radio leaking has to do with it. Is it because if the radio leaks, then there's a path for RF in either direction? Sorry, but the way that's worded, it just doesn't quite make sense to me.

Date: Thu, 1 Mar 2012 21:06:26 -0600
From: <wb5uom@hughes.net>
Subject: Re: [R-390] AN/URM-25s

I could use some help understanding this too, Im just a lowly radio tech

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Date: Thu, 1 Mar 2012 20:34:46 -0800
From: Dennis Wade <sacramento.cyclist@gmail.com>
Subject: Re: [R-390] AN/URM-25s

I think by the radio leaking, he means that the radio will pick up/be sensitive to signals coming in through paths other than the antenna connector/antenna circuit.

Date: Fri, 2 Mar 2012 08:13:11 -0600
From: "chacuff" <chacuff@cableone.net>
Subject: Re: [R-390] AN/URM-25s

If the radio is so designed that RF can get out of various stages to the outside world those same weaknesses that allow the rf out will also allow RF in. If your signal generator/cable is leaking RF it becomes a significant local RF source. You may have the internal attenuator set to .001uv but you have a high level of RF going into that attenuator and if it's leaking to the outside world before being attenuated at some point you reached a point where the radio was detecting the leakage at a higher level than what you are pumping down the coax to the antenna connector. Leading one to believe you have stumbled on the holy grail of hotness. A receiver that is sensitive beyond dis-belief. Reach up and disconnect the coax from the signal generator...are you still receiving the signal? It's leakage....

Date: Fri, 02 Mar 2012 12:26:07 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] AN/URM-25s

I accept the description. However, Roger R. and his equals that worked on this specific combination of AN/URM-25s and R-390s/R-390As, achieved some very
impressive results. The got very good S/N ratios, and high sensitivity. <snip>

Date: Fri, 2 Mar 2012 19:16:39 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] AN/URM-25s

Its not so much that we worry about leaking on the bench.
It's when you go back to trying to receive with that radio.

At Ft Devens Mass about 50 miles from WBZ Boston, WBZ was every where on the dial. To get WBZ every where it had to mix with some thing else in some kind of mixer. We found all kinds of things that would mix two RF signals OK WBZ and some other signal. I pick on WBZ but almost every other AM station had a signal at more than on spot on the R390/A's with just a 3 foot test lead for an antenna in the class room. Radios all over that base were radiating non stop as were generators and transmitters.

I wish I had a radio room screened as well as the rooms I use to get to work in. The stuff that invaded my receivers in San Diego and LA for years made reception almost not worth turning the radio on. My site here in Westminster South Carolina is a lot better but not like a good screened room. Just adding a top and bottom cover does not fix most of the problems. Also just parking the receiver in a metal cabinet does not do much better. Maybe if I had the rack setting in several inches of water (That expirment was conducted at least once at Phu Bia during a typhon.) I could get a good ground and better shield the receiver.

Not that the screened rooms were all that great. We would have operators come into the shop and ask us to to get our --- ---- off that frequency as soon as we could because it was parked on some thing that was beating with some thing else on the antenna and killing the dit of real interest. The real problem was we did have signal generators in the box that leaked and you could tune then to frequencies that would cause receiver interference.

Date: Fri, 2 Mar 2012 20:02:51 -0600
From: <wb5uom@hughes.net>
Subject: Re: [R-390] AN/URM-25s

<snip. …..but I dont think a modern top of the line signal generator has the issue being referenced. At least I have not seen it in my limited playing with HF here at home with my commercial playtoy service monitors. I do know if I leave the sig generator with a 3 foot jumper unterminated on the output with a couple

of microvolts of RF being generated it is heard in several receivers nearby, but when below 0.35Uv or so, it does not happen. At least I have not seen it. ……

Date: Sat, 03 Mar 2012 12:08:47 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] HP-410B Pics

The pics of the HP-410B chin connection jacks are now up on Mike's site.
<http://hamstuff.ath.cx>

Date: Sat, 3 Mar 2012 12:23:34 -0500
From: Thomas Chirhart <k4ncgva@gmail.com>
Subject: [R-390] AN/URM-25 rebuild

Was it the R-390 list or another I subscribe to that identified a YL that specialized in reworking URM-25's? Can anyone ID her and contact info? I just picked up a decent 25-D and would like it checked put. Reply direct if you prefer.

Date: Sat, 03 Mar 2012 12:32:32 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] AN/URM-25 rebuild

That WAS Ashley Hall. Kiss-Electronics.com.
However, she and her crew no longer do this.
I do have their parts list and procedure for the rework.
It is on-line at: <http://home.comcast.net/~rbethman/Parts-Proc.txt>

Date: Mon, 05 Mar 2012 23:04:07 -0800
From: Jim Hill <JJan-3@cox.net>
Subject: [R-390] AN/URM-25D Repair Info - More

<snip> If you decide to refurbish your AN/URM-25D, there's an excellent article in the Hollow State Newsletter, written by Dallas Lankford. The generator is inconveniently small for easy repairs, and the article guides you through refurbishment, avoiding many pitfalls. I worked on mine, replacing almost all capacitors (because they were bad, not a shotgun replacement), most resistors, and the germanium diodes. The Hollow State News stopped publication around 2002 as the Internet became more popular, and I think Dallas is no longer active. He wrote many interesting articles in the past, and

I'm guessing he was involved in refurbishing AN/URM25-D's used at an University in Texas. Maybe someone has the article on-line. If not, and if you are interested, I'll scan mine.

Date: Tue, 6 Mar 2012 11:29:11 -0500
From: Steve Byan <stevebyan@verizon.net>
Subject: Re: [R-390] AN/URM-25D Repair Info - More

This doesn't include the URM-25 rebuild info (it's not a complete set of HSN), but try these:

http://mikea.ath.cx/hsn-issue-1-12.pdf
http://mikea.ath.cx/hsn-issue-13-25.pdf
http://mikea.ath.cx/hsn-issue-26-37.pdf

I have up through issue 53 in pdf form, obtained via a pointer from the R-390 list; I don't remember which URL and my work web-nanny is preventing me from checking them out right now, but it's one of these:

> There are additional HSN issues under Barry Houser's (he became a SK
> since about a couple of years ago) website,
> http://site298.mysite4now.com/barryhauser/ and click the Archives
> button, more issues are there up to #53.
> I sent this to Perrier but I suppose the rest of you might have some interest as
>well. I have all of the HSN in a 22mb zip file on my mediafire account.
>You should be able to get it here:
> http://www.mediafire.com/?0ljgwi19fhlbwno

If there is enough interest I'll host them on my site. I have an index through issue #45; it says the URM-25D rebuild article was in HSN #39, page 6. There are other references to the URM-25:
General: 21-4&5, 31-3, 32-8, 41-7,
Modulation oscillator problems: 34-6
Repair case history: 38-6

Date: Tue, 06 Mar 2012 11:37:30 -0500
From: "David C. Hallam" <dhallam@knology.net>
Subject: Re: [R-390] AN/URM-25D Repair Info - More

The Dallas Lankford information used to be available at this site http://www.kongsfjord.no/dl/dl.htm but it doesn't seem to be active anymore. Too bad, there was valuable information there. Maybe someone knows if it has moved elsewhere.

Date: Tue, 06 Mar 2012 11:53:38 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] AN/URM-25D Repair Info - Dallas Lankford Maintenance notes

I have the Dallas Lankford Maintenance notes in PDF form. I'll put them on MY site today. <snip>

Date: Tue, 6 Mar 2012 12:01:12 -0500
From: Nick England <navy.radio@gmail.com>
Subject: Re: [R-390] AN/URM-25D Repair Info - More

The Wayback Machine is your friend - grab 'em while you can...
http://web.archive.org/web/20101124124237/http://kongsfjord.no/dl/dl.htm

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Date: Tue, 06 Mar 2012 12:35:16 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] urm-25 notes and a bit more

The Dallas Lankford pdf and two more notes are uploaded to MY site.
They can be obtained by downloading:
<http://home.comcast.net/~rbethman/urm25notes.zip>
This indeed covers the Dallas Lankford Maint Notes.

Date: Tue, 6 Mar 2012 13:43:20 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Hollow State News, Index

I have a spreadsheet formatted index of the HSN collection by topics. Email me if you want the spreadsheet, it was written by someone else (Reid Wheeler). URM-25D references can be found in editions;

general	21-4&5, 31-3, 32-8, 41-7
oscillator	34-6
repair case history	38-6
rebuilding	39-6

Back in '07 I went on a quest to collect as much as I could on the HSN editions and I have the same collection up to #53 as has been posted on the list. I also have a rewritten (HM) edition of issue #29 and another one dedicated to the R-390 (HSN-R390.pdf). At the time I was fortunate enough to be able to reach many of the contributors before they went (SK). Anything I have copies of is free for the asking. When I was collecting the editions that was the stated and implicit desire, to make the old editions available.

Date: Tue, 6 Mar 2012 13:48:06 -0600

From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] AN/URM-25D Repair Info - More

A few months ago Dallas Lankford pulled his Yahoo list back into private mode with a very limited membership. It is a shame, I was really enjoying his work on antennas, Norton pre-amplifiers and BCB expeditions.

Date: Tue, 06 Mar 2012 16:12:06 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] HSN Docs

The following are being posted to MY site for a month or two. Another list member provided them to me with the intent that I load them on my site. This should be more than adequate for folks to get a copy of. I am NOT going to become an Edebris! I don't have the time nor the patience for such, not to mention the site space. However, I do my best to assist the list. Here's the list:

HSN-Accessories.pdf
HSN-Accessoriesindex.pdf
HSN-Hammarlund.pdf
HSN-Hammarlundindex.pdf
HSN-R390.pdf
HSN-R390index.pdf
HSN-TestEQ.pdf
HSN-TestEQindex.pdf
Best of Hollow State by Reid Wheeler.doc

Each of these is preceded by:<<http://home.comcast.net/~rbethman/>
I am going to load them right after this is sent.

Date: Tue, 06 Mar 2012 16:31:23 -0500
From: "Jim" <jbrannig@verizon.net>
Subject: Re: [R-390] Hollow State News, Index

I have an 11 page .pdf titled: "URM-25D Maintenance Notes"
Dallas Lankford Nov 1988 If anyone wants a copy, e-mail me

Date: Tue, 06 Mar 2012 16:46:33 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Hollow State News, Index

That is part of the zip file that I posted earlier. It resides within the zip file along with two text files that are additional notes.

<http://home.comcast.net/~rbethman/urm25notes.zip>

The zip file contains the noted PDF plus:
urm-25notes.txt
urm-25references.txt

The entire zip size is 287 KB.

Date: Tue, 6 Mar 2012 16:05:51 -0800 (PST)
From: John Saxon <johnbsaxon@yahoo.com>
Subject: [R-390] Capacitor tester...

I recently came into a 390 and 3 390As (I must be living right!). I am not an experienced restorer, and I am looking forward to becoming one :-)

Question: I have been working on equipping my workbench and I don't have a capacitor tester. Do I want one? I have a multimeter that measures capacitance, but I don't think it sufficient for testing old caps, especially electrolytics...am I correct? Any suggestions?

Date: Tue, 06 Mar 2012 19:17:51 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Capacitor tester...

You indeed are living right! Welcome to the list, and welcome to our little part of the world! A capacitor testing capability does not hurt. You can go for the newer Sprague TO Series testers, or you can even go for an older but well functioning Heathkit C-3 or such. There is a certain reality to the old gals.

Look under the modules. Should you encounter the old Brown Beauties of Death, then don't bother even testing. These are an automatic replace item. However, should you be in possession of something such as a '67 EAC, then there will only be a small number to get concerned with. The best thing to do right now, is to identify whom made each of the receivers, and let us as a collective, know what you have. Having that information, the collective list knowledge can be brought out to give you the best plan for the endeavor that you are about to start upon. This is not meant to put you off. It is a necessary part of what is needed to know before anyone on the list can begin to give you GOOD advice.

Date: Tue, 6 Mar 2012 18:35:58 -0600 (CST)
From: nryan@mchsi.com
Subject: Re: [R-390] Capacitor tester...

I like my Sprague Tel-Ohmike Capacitor Analyzer, model TO-6A. I'm sure there are others that you'll hear about from the list, but you can't go wrong with the Sprague. Who knows, maybe your luck will continue and you'll score a nice unit somewhere. Otherwise, have fun with your new acquisitions!

Date: Tue, 6 Mar 2012 18:42:40 -0600
From: "Don Cunningham" <donc@martineer.net>
Subject: Re: [R-390] Docs

First, Bob, thanks for what you are doing. It helps to have the docs available at one site instead of people having to send them separately. I only wish I had some space to offer, but that's not part of my ISP's service unless "extra" is paid, hi. Side issue: would anyone have the documentation for the LogiMetrics 925-S125 signal generator?? I see on searching the web some manual copies for sale (even found one original pretty pricey), but was wondering if anyone here might have the docs in pdf.

Date: Tue, 6 Mar 2012 20:01:53 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Capacitor tester...

While there are lots of choices, one of the nicer things about the Tel-Ohmike and other testers like it is the ability to put a bias on the device under test (DUT) and measure leakage. I have a General Radio 1617B that will do that. I just bought a Marconi TF-1313 that's supposed to be a 1/4% bridge but doesn't have quite the voltage bias capacity of the Sprague or the GR.

I've wanted to get a nice, accurate digital cap meter for a long time but just haven't wanted to put down that much money for one yet. I don't really need that kind of accuracy for boatanchor work.

Date: Tue, 6 Mar 2012 20:07:58 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Capacitor tester...

...and, sadly, to correct my own post, the Marconi doesn't do leakage testing. Don't know what I was thinking. I guess I can claim it's because it's new to me...

Date: Tue, 06 Mar 2012 20:09:19 -0500
From: k2cby <k2cby@optonline.net>
Subject: [R-390] Capacitor Tester

You have asked a very simple question, and you are going to get a very complicated answer ? probably one that is going to provoke quite a bit of comment from the rest of the guys on the list.

The very first point to consider is that most capacitors: especially the failure-prone paper capacitors used in the R-390 R390-A known as “Brown Beauties” which fail short rather than open. This is true of all paper capacitors, whether tubular or postage stamp format. Mica capacitors tend to fail open, but failures of any kind are MUCH less common than with paper capacitors.

In my opinion, the most useful capacitance checker of all is a simple Voltmeter: a VTVM preferably or a 20,000 Ohms-per-volt VOM otherwise. Go through the various stages and compare the tube pin voltages with the charts shown in the service manual. (A tube socket extender makes the job much easier.)

1. Too high a voltage on the control grid ? suspect leakage on the capacitor coupling the grid to the preceding plate.
2. Too low a screen grid voltage ? suspect leakage on the screen bypass capacitor.
3. Too low cathode voltage ? suspect leakage (or more likely a dead short) on the cathode bypass.
4. No AGC, unreliable AGC, or bizarre AGC voltages (such as zero or positive) ? suspected one of the many AGC bus bypass capacitors is leaking.
5. AGC hangs up ? suspect an AGC bypass or time constant capacitor.
6. Noise limiter doesn’t work except when “off” ? time constant capacitor in the noise limiter or AGC circuit.

That being said, the chief problem with any capacitance checker is that you have to disconnect one side of the capacitor to test it. If you have gone to all that trouble, you might as well disconnect the other side and replace the capacitor (orange drops are a favorite among R-390/A enthusiasts) and be done with it. (By the way, if you do this and keep a pile of the capacitors you have pulled out and replaced, you will find that 99% (if not actually 100%) of them test ?good? and the others are passable for non-critical applications.)

If you are determined to use a capacitance checker, the Heathkit IT-11 is

about as good as it gets. Stay away from the CT-1; it's not very useful. My next choice would be the EICO Model 950B R-C Bridge. It is about the same as the Heathkit IT-11 but not quite so fancy and not as easy to use (but usually a lot cheaper). Next on my list would be the military ZM-11/U and finally the ZM-3 capacitor analyzer. (This is the cr?me de la cr?me of 1950-1960 capacitance testers.)

Caveat: Both of the latter two are R-390 vintage tube-type equipment test instruments ? they are SUPER on tube-type equipment, but aren?t very helpful for solid state electronics (especially electrolytic and tantalum capacitors built to modern specs).

I'll withhold comment on the Sencore instruments, since I've never used one.

Date: Tue, 6 Mar 2012 19:58:48 -0600
From: "chacuff" <chacuff@cableone.net>
Subject: Re: [R-390] Capacitor tester...

John I'm a firm believer in using a cap analyzer in tube radio work. The cap really needs to be tested at its rated voltage for leakage current. I have been using the Sencore products for years. The LC-53, LC-73 and currently the LC-102. They work great. A bit pricey at times but if you wait and watch you can usually pick one up priced right.

It can be as simple as using a megger type device with the crank on the side. Works for fishing too if you don't get caught...:-)

The important part is to check the caps at rated voltage. I can't say I have ever found a Black Beauty or Brown Beauty that tested good....all had excessive leakage. As a result I usually do a mass paper cap replacement but that is a personal thing. Many only replace a few in the radio in key spots like the DC blocking cap that can cook your Mechanical filters in the "A" models and let the rest of the rock on...

Be sure to check out the Pearls of Wisdom documents and the nicely done Y2KR390 manual....(may have that name wrong) Both are must have resources.... Good luck and drop questions on us anytime...someone will always know the answer!

Date: Tue, 06 Mar 2012 20:15:40 -0600
From: Robert Nickels <ranickel@comcast.net>
Subject: Re: [R-390] Capacitor Tester

I really like Miles' description of a successful troubleshooting method, and would only offer a slight re-phrasing of his statement above:
"the most useful capacitance checker of all is the one between your ears"

I learned a lot by watching a ham and lifelong TV/radio repairman I knew (SK) in action, he could look at a circuit, point his finger at what was most likely wrong, and then make a quick measurement to confirm it. That's how you make a living doing it for 30 years, and while I use my Sprague TO-6 mostly I feel pleased when I'm able to identify a problem by using his approach.

Date: Tue, 6 Mar 2012 18:39:51 -0800
From: "Chris Kepus" <ckepus@comcast.net>
Subject: Re: [R-390] AN/URM-25D Repair Info - Dallas Lankford Maintenance notes

Here are a few more special Hollow State News PDFs to post on your site if they are not already there. I think most, if not all were done by Reid Wheeler, according to the Word doc explanation which contains a screen shot from the original Barry Hauser web site.

HSN-Accessories.pdf
HSN-Accessoriesindex.pdf
HSN-Hammarlund.pdf
HSN-Hammarlundindex.pdf
HSN-R390.pdf
HSN-R390index.pdf
HSN-TestEQ.pdf
HSN-TestEQindex.pdf
Best of Hollow State by Reid Wheeler.doc

Date: Tue, 6 Mar 2012 21:12:12 -0600
From: "Don Cunningham" <donc@martineer.net>
Subject: Re: [R-390] Capacitor tester...

At the advice of a good friend, I built a capaciter ESR checker from a kit available several years ago. I got mine from Dick Smith Electronics (DSE, I believe at the time), but can no longer find that. It will read the ESR of a capacitor in or out of the circuit which is a real plus for checking these old rigs. I sure wish I had bought two of the kits while they were available, as the commercial ones I see for sale are VERY pricey!!! If you can find one of these that someone built and never used, or even an unbuilt kit, I highly recommend the use of those.

Date: Tue, 6 Mar 2012 20:34:11 -0800 (PST)
From: John Saxon <johnbsaxon@yahoo.com>
Subject: [R-390] Capacitor tester...Thanks!!

Wow!? Did I come to the right place! Thank you so much guys for the *very* helpful comments, a lot of good advice and a lot to think about. I really liked Bob's comment about taking an inventory of my radios. I will do that. I will record the manufacturer and serial number posted on the front panel, and see if I can determine the builder of the modules. Thanks again guys, and I will probably become a pest, real soon!

Date: Wed, 7 Mar 2012 16:35:41 +1100
From: John Kidd <u453902@hotmail.com>
Subject: Re: [R-390] Capacitor tester...

Hi all, Dick Smith Electronics has gone the way of Radio Shack, cell phones, TV's etc. No longer available, however, a revised version is available. The Blue ESR/Low Ohms Meter, the latest and best Bob Parker design and successor to the famous Dick Smith ESR/Low Ohms Meter.
http://www.anatekcorp.com/blueesr.htm

I have no connection to them, I have a DSE version that I built and happy with.

Date: Wed, 7 Mar 2012 01:13:17 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] urm-25 notes and a bit more

Thanks for posting those notes. NOTES::::!!!!

1. The Lankford overhaul notes were not published IN the hollow state news: They were offered as a separate item for sale BY the HSN folks (in about 1988, The cost was a dollar, I think.). A small number of related items were published in the HSN periodical.

2. If you have a URM-25F, these overhaul notes may be quiet helpful, but the F model is laid out differently, so some adaptation will have to be made. Years ago, I had an email exchange with Dallas, in which he indicated that he had never made a corresponding set of notes for the F model.

Date: Wed, 7 Mar 2012 02:00:35 -0500 (EST)
From: jrfke5ri@aol.com
Subject: Re: [R-390] Capacitor tester...

IO have been using a Sprague Tel-Ohmike Capacitor Analyzer, model TO-6A for many years. I like the fact that it can also be used to see if electrolytics can be "SALVAGED". I disconnect one side and slowly raise the applied voltage keeping the current within reason. If I can reach the specified voltage and have leakage current also within spec, I feel fairly safe in keeping the old capacitor. This is also an excellent way to safely "re-form" them.

Date: Wed, 07 Mar 2012 08:53:22 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Capacitor Tester

Miles makes excellent points. They are certainly not erroneous. It becomes a matter of how one chooses to perform tests. The Brown Beauties are definitely prone to failure and are essentially a known and automatically get replaced. That being said, This also is why it is important to know precisely which radios were built by whom, and the specific date of contract. '67 EACs do not have the aforementioned BBODs,, (Brown Beauties of Death) also some are Black BODs, although I have not located any of the Black ones in the R-390 series. The '67 EACs have some good Sprague Vitamin Qs, and Aerovox caps. So we have to look at different ways to test, AND determine which issues you are going to find and have to deal with.

Date: Wed, 07 Mar 2012 08:53:22 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Capacitor Tester

Miles makes excellent points. They are certainly not erroneous. It becomes a matter of how one chooses to perform tests. The Brown Beauties are definitely prone to failure and are essentially a known and automatically get replaced. That being said, This also is why it is important to know precisely which radios were built by whom, and the specific date of contract. '67 EACs do not have the aforementioned BBODs,, (Brown Beauties of Death) also some are Black BODs, although I have not located any of the Black ones in the R-390 series. The '67 EACs have some good Sprague Vitamin Qs, and Aerovox caps. So we have to look at different ways to test, AND determine which issues you are going to find and have to deal with.

Date: Wed, 07 Mar 2012 09:29:41 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Capacitor tester...Thanks!!

No question of coming to the right place! Serial numbers are "less" important than the manufacturer, and the specific contract date.

Modules are very likely a grab bag of what was available at the time it went through either Depot, or the shop that worked on it. Modules are VERY well known to have been swapped around to enable the radios to get back into use. I've only seen two radios that had all the modules that were by the manufacturer stated on the dataplate on the front panel.

Testing by VOM, VTVM, ESR, and/or a capacitor tester are all valid methods. It becomes a matter of what is available, and how one goes about doing what that particular person elects to do. I actually use a mix. My VTVM gets first use - IF the radio is up to applying power. I had an up and functional '67 EAC. That made things easier. The second one that I obtained was one of the original '51 contract Collins. Since it was a "Blue-Striper", one of the St. Js survivors, powering it up was NOT an option. Hence you'll get different views as to how you should proceed. Miles, and Done make very valid points. I'll second the "touch" to feel warmth. Either a laser temp device, or a thermocouple that comes with a DVM is much preferred than putting one's finger into the midst of circuitry that may well bite one! The voltages vary dependent on the particular circuit being examined. <snip>

Date: Wed, 7 Mar 2012 12:51:40 -0600
From: "Don Cunningham" <donc@martineer.net>
Subject: Re: [R-390] Capacitor tester...

THANKS for that information. I had searched a few years back, but didn't find this link. Now I can have a blue readout one to go with my red one, hi. These meters do root out bad capacitors quickly. I too have NO connection with these folks, but the price is the same as I paid years ago, and it has even been improved!!

Date: Wed, 7 Mar 2012 11:28:29 -0800
From: Pete Lancashire <pete@petelancashire.com>
Subject: Re: [R-390] Capacitor tester...

The LC-100's are to me the final eveolution of the high(er) voltage cap testers. Don't have one yet, but will someday but having a TO-6A it would have to show up really cheap. BTW can't remember the URL but TO do have failure modes and should them selves be 'restored' be using. Ditto for Eico 950B's. In all most all cases I replace the caps. R-390A's, SP-600, AN/XXX etc to me is worth the

time and effort. But if is is for something of much less value or a cheap BCB set, or some weird value and not enough room to parallel up, I use a Sprague TO-6A or my ZM-11/U.

Date: Wed, 7 Mar 2012 14:37:51 -0800
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] Capacitor tester...

I'd add that they should be checked when hot. Leakage goes up fast with increasing temperature. It may look okay cold. After I got my 390A, I decided to replace all of the Prokars (Brown Beauties) that were (a) highly charged, or (b) at
high-impedance points. I left the cathode bypasses alone. Just for fun, I hooked the IF deck to a current-limited power supply (B+ only), put it in the oven on low, and left it overnight. Next morning I found two shorted caps, and I was a believer.

Date: Wed, 7 Mar 2012 20:11:57 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: [R-390] Cap Testing

Worry not what is in your R390 or R390/A. It can all be fixed and returned to service. It can be done with a pair (you want to use them both at once) of mulitmeters and a signal generator. The flavor types and calibration are not important. All R390/A's were not built equal but they all are of a minimum standard that can be brought back to good performance. If they had just spent the extra 2 cents and used some thing better than those cheap brown plastic things passed off as caps.

Date: Wed, 07 Mar 2012 20:29:52 -0800
From: Jim Hill <JJan-3@cox.net>
Subject: Re: [R-390] AN/URM-25D Repair Info - More

Thanks to Bob and others for all the interesting links, I downloaded them all. Dallas also wrote a number of articles for two BCB Dxing clubs, which had the publications called DX News and DX Monitor. Back when I had pneumonia, I couldn't do much and attempted to repro all issues that contained technical articles. I discovered you could become winded just operating a repro

machine. Dallas had articles on lossless feedback amplifiers, plus some receiver mods, etc.
Bob: I downloaded all of your links. Those containing the word "index" didn't work, but the others worked fine. I cut and pasted, so don't think I had any typos. Nick: Thanks for the link covering his papers. I didn't know about his "group" or would have emails containing the posts. I usually use that option - where you receive emails of all the posts. Too bad.... I think I have a complete file of Hollow State News. I subscribed while it was still active and ordered back issues. I'll check when a return from a one-week trip, which starts tomorrow and ends a week from Sunday.

Date: Wed, 7 Mar 2012 21:06:20 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] Capacitor tester...

For leakage testing with a reasonably substantial applied voltage, don't forget the method advocated by Dr. Jerry. This method uses a DC power supply in series with a high impedance voltmeter such as a DVM. More about this method and multitudinous other R-390 topics will be found in "Pearls of Wisdom" at r390a.net.

Date: Thu, 8 Mar 2012 09:00:10 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Capacitor tester...

> For leakage testing with a reasonably substantial applied voltage, don't
> forget the method advocated by Dr. Jerry……

I thought about that after I sent the post. The only reason I don't use that method is a lack of a good HV supply. That's what makes the GR1617A so handy.

Date: Tue, 13 Mar 2012 15:01:07 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] URM-25 info - doc

I stumbled upon an envelope that got here some time back. I apologize, it came during all the doctor chasing issues. This file is composed of six pages that

apply to the URM-25D refurb. The first two pages of this document, (I used MS Word 2010 - BUT saved it in Word '97 - 2003 doc format), are from the NAVSHIPS 92134(A).pdf that is on EDEBRIS, and refer to frequency alignment. The remaining four pages are notated schematic pages from the above manual, and are in fererence to the refurbishment procedure. Additionally, the 5VDC lamps noted by these folks are Jameco SKU141066. This document is on my site. This is NOT a small file! It is 34,410KB - IOW just a tad over 34MB. This is the best I can get it down to. The individual pages scanned @ 24MB each. This is why I inserted them into Word Document. Don't ask for it to be zipped! I already tried this, and it saved 210KB. Hope this makes more sense for those trying to rework one of these.

Date: Tue, 13 Mar 2012 15:49:39 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] URM-25 info - doc AMENDED

Thanks to Al Parker! He downloaded it and converted to an Adobe pdf file.
It is now only 6MB in size.
<http://home.comcast.net/~rbethman/urm25/urm25.pdf>

Date: Sun, 1 Apr 2012 17:08:15 +1000
From: "bernie nicholson" <vk2abn@bigpond.net.au>
Subject: [R-390] Tek 500 series CRO s

Hello John and everyone , over the years I bought hundreds of 500 series cro s from the Government Auctions here in Australia , Back in the 70 s and 80 s . A common fault I found with the 547 s is the filament winding for the CRT going down to earth , Rather than replacing the whole transformer I used to connect up a separate well insulated filament transformer [the cathode is about 1500V above earth , This fixed the problem , The commonest fault I used to find in all the 500 series Cro s was Failed open circuit dried out Electrolytic Bypass cap for the 50Khz osc. in the Eht supply the Oscillator tube has grid leak bias and as the 50Khz wanders around the chassis the output drops off , and the Bias gets less dissipation goes up and eventually the tube plate glows red ,symptoms the Trace is bright when first turned on then gets dimmer after about 5 minutes goes out altogether , I Got to know these units pretty well , Overall they were pretty good the 547 s had a Tunnel diode trigger circuit , The tunnel diodes used to fail , there is one in each timebase ,so the other could be changed around to check the fault , and the Miller time base could be tricky, I remember one very difficult to find Fault , I ended up Meggar testing Every cap in the "A" timebase , One 500Pf cap measured 300Megohms , when I replaced that it worked perfectly ,the miller timebases rely on the tubes internal capacity to oscillate , and it doesn't take much to stop

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Date: Sun, 1 Apr 2012 09:07:07 -0700
From: Pete Lancashire <pete@petelancashire.com>

Subject: Re: [R-390] Tek 500 series CRO s

One of the best resources for the older Tek gear is two Yahoo groups TekScopes and TekScopes2 The 547 HV transformer has been pretty much reverse engineered and there is one member the last time I was visiting the group was rebuilding them. They are all failing due to moisture. They are one amazing piece of Tek gear from the BA period.

Date: Sun, 5 Aug 2012 21:03:31 -0400
From: Robert Newberry <N1XBM@amsat.org>
Subject: [R-390] Testing tubes r392

I would like to test the tubes in my r392. Can I test those tubes in a standard tester? Or do I need a special tube tester? FYI I'm relatively new to the vacuum tube world.

Date: Sun, 05 Aug 2012 21:34:42 -0400
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>
Subject: Re: [R-390] Testing tubes r392

Is the R-392 working? If so your tubes have been tested by the best tester available, the equipment that is using them. If the R-392 is not functioning, do you have a service manual? If not this should be what you get next. I would then isolate the defective stage(s) and check the tubes that are possibly causing the problem. Any standard tube tested that has setup information for the tubes in question will work. A mutual conductance tester would be best.

Date: Mon, 6 Aug 2012 09:56:31 +0200
From: sigmapert <sigmapert@gmx.de>
Subject: Re: [R-390] Testing tubes r392

If you're collecting vacuum tube gear in my opinion a tube tester is a must. The most authentic tube tester for military vacuum tube gear undoubtedly is the TV-7D/U. Because the TV-7 was the standard tube tester used in the maintenances all over the world this tester isn't rare. Lookout for the most recent model D. Here a TV-7D/U in pristine condition:
http://schmid-mainz.de/TV-7-D-Ecco/Final/Ecco-04.jpg
No, I do not sell one.

Aug 6, 2012 7:45 AM, "Bob Camp" <ham@rtty.us> wrote:

> Even in the best case tube testers aren't perfect. In this case even less
> so. The 392 runs the tubes at 28 volts on the plates. Tube testers are
> going to test them with something much higher.
>
> Yes, do get a tester. Better yet get two of them so you have a backup?

Date: Mon, 6 Aug 2012 08:26:10 -0400
From: Robert Newberry <N1XBM@amsat.org>
Subject: Re: [R-390] Testing tubes r392

I have an EMC 205 tube tester. I bought...so I guess its time to figure it out.

Date: Mon, 06 Aug 2012 11:10:14 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Testing tubes r392

I have a different opinion on this - while the TV-7 series is indeed a fine tester, and period "correct" for much military vacuum gear; it is by no means the "most" on several counts.

In my opinion - the TV-3B is far more collectible as a period piece - and certainly as competent as a TV-7 for most early military tube gear. With it's built-in Multi-meter and "hidden power cord compartment" - it's "coolness" factor is almost off the scale. When it comes to competency - the TV-10 is (IMHO) far more useful than a TV-7 - as it does not require a "chart" to test a tube - it can be set up using a tube manual and since is reads directly in umhos -it's readings are directly useful (the TV-7 series reads in 0-120 "quality" -- requiring extra work to determine an actual reading).

The TV-10 can also be used to "beam" a tube (heavy current blast - to blow crud off the elements and expose fresh emitter areas).

Date: Mon, 06 Aug 2012 12:44:44 -0400
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Testing tubes r392

>used to "beam" a tube (heavy current blast - to blow crud……..

Egad! What a way to destroy tube cathodes. Oxide-coated cathodes are not meant to have crud "blown off." And apart from the direct damage to the

cathode, anything you "blow off" it has to settle somewhere, and some will settle on the grid -- where it will cause grid emission (which often leads to thermal runaway).

Thoriated tungsten filaments (directly heated) can sometimes be partially rejuvinated by running the filament current up a bit, but with antique tubes you are much more likely to open the filament at a weak spot than to improve emission. Bad, bad idea.

Date: Mon, 06 Aug 2012 12:47:39 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Testing tubes r392

There are few that seek to collect and retain "period" pieces, other than a few pure collectors. The TV-10 is just fine. However, I'll stick with the later WE labeled Hickok LS-1XXXXX series. It adjusts to the line voltage, and reads directly in mhos.

There is one flaw in "blasting crud" off tube elements by "heavy" current blasts. The one element that may "need" this is the filament. This would occur in thoriated tungsten filaments. It would be prudent to keep this "blast" per se, down to a certain percentage above the normal operating curve. The key being "current" in lieu of voltage. The element will only take a certain amount of current,, as its resistance is essentially fixed. Yes, there is some degree of variation depending on whom made the tube, but it is just like testing a fuse with an over current. These aren't circuit breakers. One blown, the method of repair becomes solely replacement. The older some of the tubes are, and how much the audio crowd has latched upon them, determines how much this replacement is going to cost you.

Date: Mon, 06 Aug 2012 14:11:17 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Testing tubes r392

> …….Bad, bad idea…….

Why? any competent technician would only resort to such on tube that is otherwise useless - if it gets another few hours out of an otherwise worthless tube - how is that bad, bad idea? Surely you're smart enough to know better than blasting a "good" tube - I mean - what would be the point? Sheesh.

Date: Mon, 06 Aug 2012 14:17:46 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Testing tubes r392

> have a TV-7. What is… method to convert the 1-120 quality reading to umhos?

If you know what umho the tube is rated at - and you assume that 100 quality is that number (or near enough) one can make some reasonable calculations.
> can you just build a speadsheet for this and use it as a referral?

That'd be one way - but I'd probably want to compare "quality" reading against the same tube's umho reading in a TV-10 (or TV-2 better yet).

> Or, better question, what's the best way to make the conversion?

I would take a bunch of tubes - several new tubes representing several values of "new" emission; and then a couple hand-fuls of older well used tubes - see what they read in a TV-10 (or TV-2) and a TV-7 - and that should give you some confirmation of "quality" to umho for your tester. just what I'd do...

Date: Mon, 06 Aug 2012 14:29:09 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Testing tubes r392

> There is one flaw in "blasting crud" off tube elements

Don't know what you're referring to... the blast I'm talking about is to hold down the P3 emission test (to apply normal test voltages) then just *ever* *so* *lightly* *just* *tap* the OZ3 button... You'll get a boost of HV (meant to fire the gas in an OZ) which will "hopefully" arc the crud off the elements without opening them up. This "method" is what was used by the old CRT "Beamer" devices of the 50s and early 60s. Again - should be applied to a tube that is otherwise already shot - as if it rips a grid - (which can and does happen) - then the tube is a paper-weight. Again - as noted - this is a voltage blast - hopefully so short the arc doesn't burn "through" stuff...

Date: Mon, 6 Aug 2012 14:10:19 -0700 (PDT)
From: Steve Toth <stoth47@yahoo.com>
Subject: [R-390] TV-7 micromhos

Thanks to Francesco in Italy! (the internet is a wonderful thing....)

He emailed me a tip to look in the -35 manual for the TV-7 for a chart that converts meter readings to micromhos. Page 7 of the -35 refers you to paragraph 20 of the -12 manual, Operator and Organizational Maintenance Manual. I looked it up and there it was for each switch range.? Very cool. Both manuals are on the BAMA site.

Date: Mon, 06 Aug 2012 17:28:43 -0400
From: k2cby <k2cby@optonline.net>
Subject: [R-390] TV-7 Micromhos

Here is the table:
Transconductance Measurement with the TV-7 Tube Checker

Use the following table to convert the meter reading to transconductance in μ Siemens (μMhos).

Meter Reading	Transconductance Siemens (μMhos)			
	Range B	Range C	Range D	Range E
0	0	0	0	0
10	250	500	1,250	2,500
20	500	1,000	2,500	5,000
30	750	1,500	3,750	7,500
40	1,000	2,000	5,000	10,000
50	1,250	2,500	6,250	12,500
60	1,500	3,000	7,500	15,000
70	1,750	3,500	8,750	17,500
80	2,000	4,000	10,000	20,000
90	2,250	4,500	11,250	22,500
100	2,500	5,000	12,500	25,000
110	2,750	5,500	13,750	27,500
120	3,000	6,000	15,000	30,000

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e-mail: k2cby@optonline.net

Date: Tue, 7 Aug 2012 11:51:11 +1000
From: "bernie nicholson" <vk2abn@bigpond.net.au>
Subject: Re: [R-390] R-390 Digest, Vol 100, Issue 4

Hi To all , On the subject of tube testers, most military radio gear and test equipment from the tube era, will have a list of electrode voltages in the Handbook relating to the potential on various pins, I have always located faults by measuring the voltages and checking against the list, one can see what's happening by for instance measuring the voltage drop across a screen resistor and plate resistors, and cathode resistors, if there isn't a voltage drop, NO current is flowing, and mental arithmetic will give you a picture in your mind of what's happening or not! In the 1960 s when tubes were the go, people who resorted to tube testers were known as TUBE JOCKEYS, and were looked down upon by REAL service men , When you look at the Signal Corps specs, for a receiver like the AR88 , they state that ANY or ALL of the tubes can be down to 30% emission and the radio still has to perform to spec, most tubes in the 390A are running VERY conservatively. When using a
tube tester I would imagine that lots of tubes are discarded prematurely, I have always regarded the circuit the tube is working in as the best tester for the tube. Tube testers have their place, ie: in a lab to check batches of tubes are in Spec etc. Our family had a TV set that was purchased in 1956, it was still working well with most of the original tubes in 1975. Tubes like vertical and horizontal output, damper diodes and the cascode triode in the front end were replaced a few times as they work harder, but about twenty tubes were original and had survived daily use for two decades. But if one had tested them on a tube tester regularly They would mostly have tested "BAD" Regards to all, Bernie VK2ABN

Date: Sat, 23 Mar 2013 23:19:09 -0400 (EDT)
From: L L bahr <pulsarxp@embarqmail.com>
Subject: [R-390] B&K Dynascan Model 177 VTVM

I picked up a really nice B&K Model 177 Dynascan VTVM today at a local hamfest and would love to find a manual for it. (It looks like it is new). Bye chance, is there anyone on here with a manual for one they would sell or steer me to where I might find a copy? I checked the B&K site which has manuals on it but this instrument is too old to list. I think this VTVM will really be useful aligning my old boat anchors. (I see one was sold on e-bay awhile back and the manual is 15 pages in number).

From: "Don Cunningham" <donc@martineer.net>
Subject: Re: [R-390] B&K Dynascan Model 177 VTVM

I have one of those as well and no manual. I have searched everywhere I can think of and haven't found one. If someone should send a source to you offline, would you share it?? I think it would be a very nice VTVM to use with boatanchors too.

Date: Sun, 24 Mar 2013 07:47:56 -0600
From: Anthony Casorso <canthony15@msn.com>
Subject: Re: [R-390] B&K Dynascan Model 177 VTVM

A Quick check with Google and I spotted a manual with schematic in PDF frmat:
http://radiorestorer.com/bk177v-95.PDF

Date: Sun, 24 Mar 2013 18:21:45 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] HP 3586 Problem

I was checking out two operational HP 3586B?s which I normally use for RF work on the lower frequencies and found out one would not sync below 300 KHz or so and the other below 200 KHz on the Fo rear output connector. So I contacted my friend Mike Fisch and asked him to do the same test and his Fo output would not sync below 1 MHz. So my questions to the list are: 1. Do other owners of HP 3586 units have the same problem? 2. And if one had had that problem, were they able to fix it, and if so how? I don’t want to touch the insides of mine until I have more information.

Date: Sun, 24 Mar 2013 21:41:50 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] HP 3586 Problem

Haven't had the problem on the 3586, but I have had it on similar HP gear. Typically it's the VCO that no longer will pull to the end of it's range that matches up with "low end". Depending on weather they did high side injection or low, that's either the high or the low end of the VCO range.

Date: Mon, 25 Mar 2013 10:19:48 -0500
From: barry williams <ba.williams@charter.net>
Subject: Re: [R-390] HP 3586 Problem

Would you remind me what the Fo rear connector is for? My 3586B is in packed up at the moment. I don't recall using any of the rear connectors for HF, LF, or VLF work. It has been a couple of years since I've used it. I have the service manual. Getting inside is a major chore due to case construction. My internal battery has died and HP says there is a risk of leakage and damage once they need replacing.

Date: Mon, 25 Mar 2013 10:59:29 -0500
From: Mike A <mikea@mikea.ath.cx>
Subject: Re: [R-390] HP 3586 Problem

According to the manual, this output (Fo rear connector) tracks the center frequency of the bandpass, at 0 dBm and 75 ohms nominal.

Date: Thu, 18 Jul 2013 22:07:03 +0200
From: sigmapert <sigmapert@gmx.de>
Subject: [R-390] Nolan Lee's work on the TV-7 tube tester

Nolan was also active in the field of military tube testers. A remarkable contribution deals with the TV-7x/U. He prepared an extensive Excel file. Date of last update is July 5, 2002. You can download the Excel file, here:
http://schmid-mainz.de/tv-7_097.xls
The following sheets are available:
Cover - Instructions - Basing Chart - "US" Settings -
CV Chart - GM Chart - VT Chart - Europ_Equiv

Date: Mon, 16 Sep 2013 19:03:20 -0700 (PDT)
From: "R. David Eagle" <kb8nnu@yahoo.com>
Subject: [R-390] Tube Testers

Ok all my boat anchor enthusiasts!? I am preparing to restore my first 390A.? My question to you all is what is a good universal tube tester to have around and what would might be a good price?

Date: Tue, 17 Sep 2013 02:01:13 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Tube Testers

Honestly, there is no need for a tube tester unless you have a pile of used tubes you are going to sell and want to be able to say they "test good." The circuit the tubes are used in is always the best tube tester money can buy. If you get some tube extenders with test points, you can measure all of the tube voltages from the tube side of the chassis.

Date: Tue, 17 Sep 2013 02:13:30 -0400
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>
Subject: Re: [R-390] Tube Testers

Your best tube tester is the instrument that you will be using the tube in.
If it works in the circuit, it is good.

Measure the voltages around the tube.
If they vary significantly from the manual, replace the tube.
If this fixes the problem, the tube was bad.
If the problem remains, put the original tube back in and find the bad capacitor, open coil or out of tolerance resistor.
Most of the resistors will be out of tolerance, high.
Any paper capacitors should be replaced with mylar or similar capacitors.
By definition, the paper capacitors are bad.

Date: Tue, 17 Sep 2013 07:34:43 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Tube Testers

The military tube testers are all fine for testing the tubes out of an R-390. Prices are silly high ($200 for a TV-7). About the only time they really shine is when you have a stack of gear that was left on well after the first tube failed. The result can be that 2/3's of the 40 tubes in an instrument are dead (and you have 10 of them to fix by 5 pm ?). They also can be a help in confirming what you already know from basic troubleshooting.

A tube tester (depending on it's design) does not test all the functions of a tube. Most do some very simple tests. An open filament will indeed fail. (Hmmmm tube is cold ? hmmm). Past that they give free advice (worth what you paid for it). A tube that tests "good" probably will work (unless it's leaky). A tube that tests "bad" may well work fine for another 10 years.

A tube tester gives you one more piece of gear to maintain (and calibrate). It's also one more thing to lug around (=why I like the small TV-7). For the money you can buy a many lifetimes supply of all the tubes in the radio. Swapping tubes is at least as good a fix as using a tube tester ?.

Date: Tue, 17 Sep 2013 09:38:56 -0700 (PDT)
From: Johnsay Johnsay <groundwave@yahoo.com>
Subject: [R-390] Tube Testers

I'd agree with this if the R-390 was the only tube type gear you had and you also had a pile of NOS tubes. Otherwise I find a tube tester indispensibe both for screening and troubleshooting. I like the military tube testers such as the TV-2, TV-7 and TV-10. The Hickock 539 is also well thought of. The cost of these units is outrageous in the current market. The Heathkit TT-1 is also good if for no other reason that it tests compactrons and is lower priced. My TV-2C is highly prized.

Honestly, there is no need for a tube tester unless you have a pile of used tubes you are going to sell and want to be able to say they "test good."? The circuit the tubes are used in is always the best tube tester money can buy. If you get some tube extenders with test points, you can measure all of the tube voltages from the tube side of the chassis.

Date: Tue, 17 Sep 2013 12:50:52 -0400
From: "KR4HV" <kr4hv@numail.org>
Subject: Re: [R-390] Tube Testers

FWIW, during the early (1970's) part of my long association with and when I worked for Motorola in their two-way radio division, we still maintained a LOT of tube sets. I never went in a Motorola shop and saw a tube tester. New tubes were always put in the radio under test and test-set meter readings, signal generator settings and other parameters observed to determine if a tube was operating to spec. Never, ever was a tube tester
used or even present in the maintenance shops.

When new I once asked where the tube tester was and I was told that "TV repair guys" used them because they didn't stock many spares and besides, testers weren't conclusive. We always had several new tubes of each type to try.

IMHO, It's best to spend your money on a set or two of running spares to have on hand. Most likely you'll need a few over the years anyway since the R-300/390A disease is usually severe and generally lasts a long time.

Date: Tue, 17 Sep 2013 13:14:46 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Tube Testers

I agree that THE circuit is the best place to "test". However, I have sufficient NOS spares for quite a few different radios. So I have one of those Hickock made Western Electric KSXXXXX testers. I am NOT giving it up! Besides, the price was right - "Take it home Bob.".

Date: Tue, 17 Sep 2013 23:54:53 +0000
From: <chacuff@cableone.net>
Subject: Re: [R-390] Tube Testers

Yep and that was back in the 70’s when tubes were young. Now days many of the tubes I use are really old NOS or in many cases pulls from other stuff over the years. I’m not fond of shoving a tube with a potential short into a radio without checking it before it goes in on something that won’t go up in smoke and cause me grief. The tube tester is good for that...weeding out gassy and

shorted tubes...sometimes NOS tubes that have been banged around for years now.

While I agree the radio is the best thing for evaluating performance of a handful of tubes once they have passed the gas and shorts test..there is still a purpose for a decent tube tester.

That said I check caps and resistors on the appropriate testers prior to placing them in the circuit too...and they are all new components. Just a peace of mind thing I guess...

Also commercial radio shops were run on a shoestring too.. Had a friend that owned one...there was no money to be made in that business...most of the test gear was really old as was the vehicles they ran around in. My shop is equipped better than most Motorola or GE service shops I've been in.

Date: Tue, 17 Sep 2013 17:00:43 -0700 (PDT)
From: "R. David Eagle" <kb8nnu@yahoo.com>
Subject: Re: [R-390] Tube Testers

Thanks to all that replied. I guess I never realized the 390a as a good tube tester...hi hi But I now have tube extenders on my shopping list of items to find so I can have test points to go off of.

Date: Tue, 17 Sep 2013 20:26:10 -0700 (PDT)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] tube tester

I picked up an I-177 years ago, and it has been useful to quickly check a bunch of newly acquired tubes. I think that tube testers are good at screening for internal shorts or open heaters, and not much else. As others have stressed, the one meaningful test of any specific tube, is its performance in a *real* circuit. After all, that is the one place where you want it to function.

Roger has outlined to us how to grade performance in each location in a R390A. It may sound tedious, but IMHO it is time well spent if you want to optimize performance. Took me a long time to finally achieve that magic 30:1 ratio in the IF-audio circuitry.

Date: Sat, 8 Nov 2014 12:59:31 -0800
From: Perry Sandeen via R-390 <r-390@mailman.qth.net>
Subject: [R-390] HP 3586B Info

I've assembled three PDF documents for the HP 3586B. An electrolytic capacitor replacement list, a 15 KHz IF pick-off doc and the Beethoven audio test. You get three for the price of one: FREE. If interested, please send me a new email off list.

Date: Sat, 8 Nov 2014 17:52:31 -0500
From: Frank Hughes <fsh396ss@gmail.com>
Subject: [R-390] HP 3586B info please!

Hi Perrier,
Yes, please!
I am trying to learn more about my HP 3586B.
I have not attempted the Electrolytic replacement yet, it is too intimidating, would be great to have a list. Found the Beethoven test while learning about the unit. No clue what the 15khz IF pick-off is.

Date: Sat, 8 Nov 2014 22:59:09 -0800
From: Perry Sandeen via R-390 <r-390@mailman.qth.net>
Subject: [R-390] Capacitor Group Buy

The common denominator capacitor for the HP 3586 is 470 uF/50V.

The HP 3586B uses about 18. The capacitor is a Panasonic P/N 667-EEU-FR1H471B

The common denominator capacitor for the HP 5370B is 105C / 6,000 Hr. 150 uF / 50V. The 3586 uses about 20.

I am willing to sell them for cost (including shipping and taxes from Mouser) plus postage plus 20% in blocks of 25. Your savings will be about 50% of the single unit price. To make this work I?ll need a commitment of 500 minimum

The HP 5370B uses about 46. If enough people are interested I am willing to make a group buy in blocks of 100. The capacitor is a Panasonic 105C / 6,000 Hr. P/N 667-EEU-FR1H151B.

I am willing to sell them for cost (including shipping and taxes from Mouser) plus postage plus 20% in blocks of 50. Your savings will be about 50% of the single unit price. For this to work I?ll need a commitment of 1,000 minimum. Parts will be cash up front. If you do the math you will see I'm better off working for Mickey D.

If interested, PLEASE send me an ORIGINAL email off list. I inform everybody by email if it is a go. Some have not been doing this and it screws up my Yahooey mail and I may miss your order.